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THE AGRICULTURAL GAZETTE OF NEW SOUTH WALES

NOVEMBER

1933

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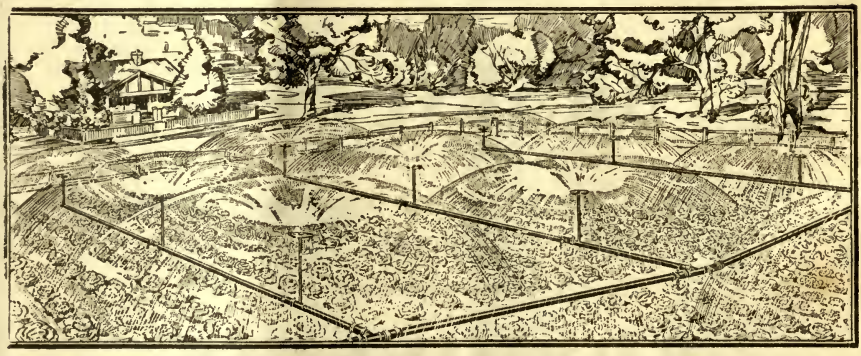
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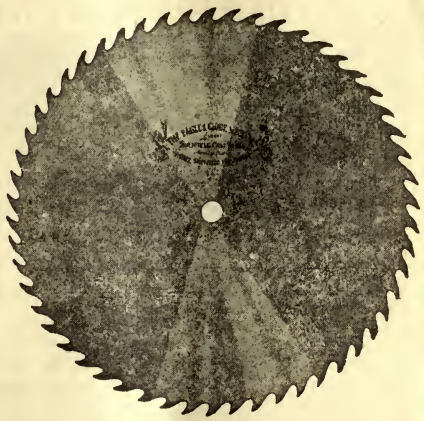
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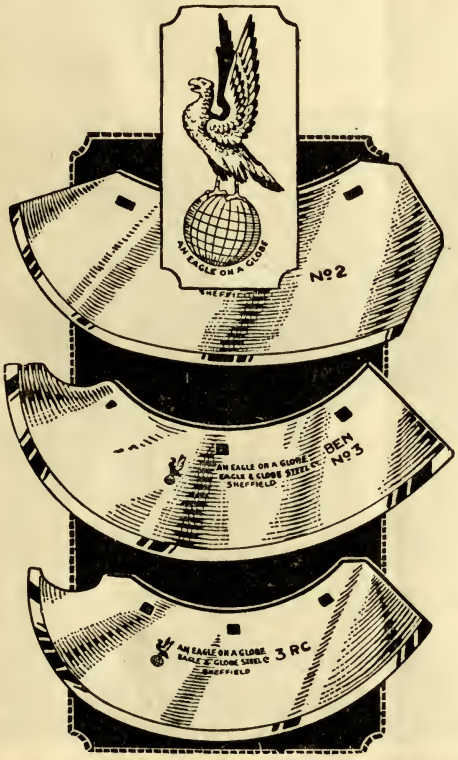
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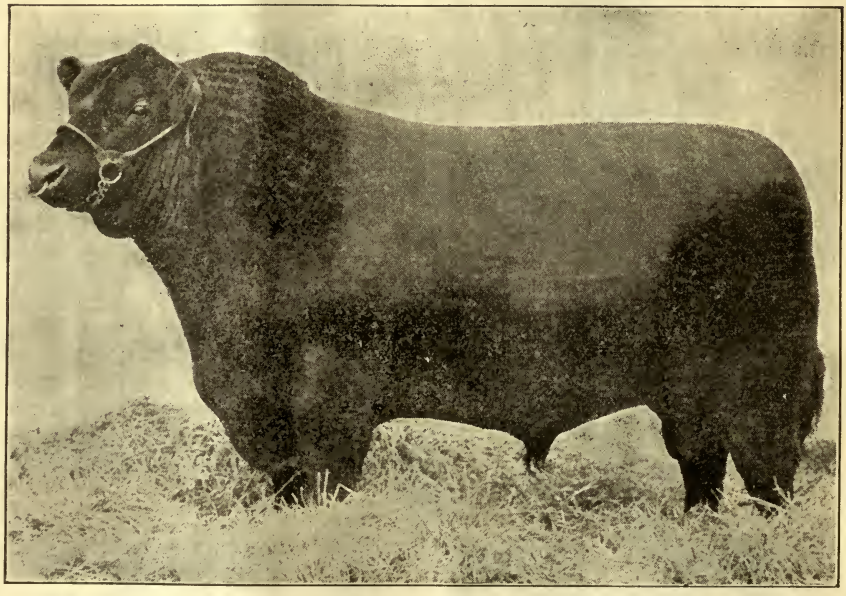
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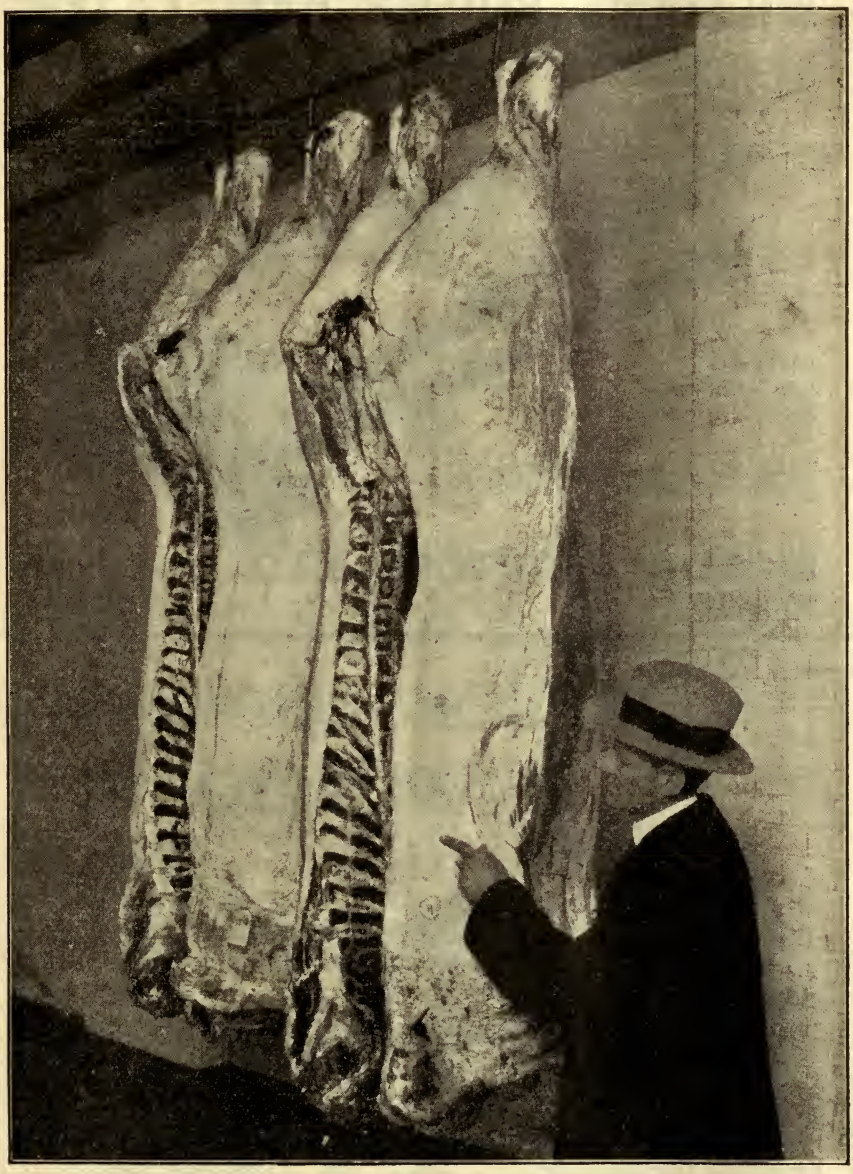


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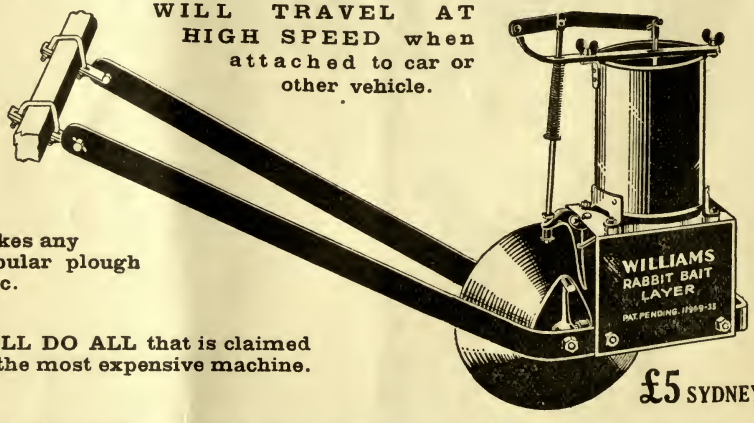
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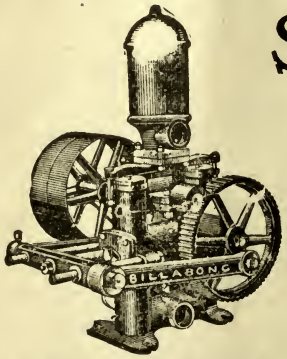
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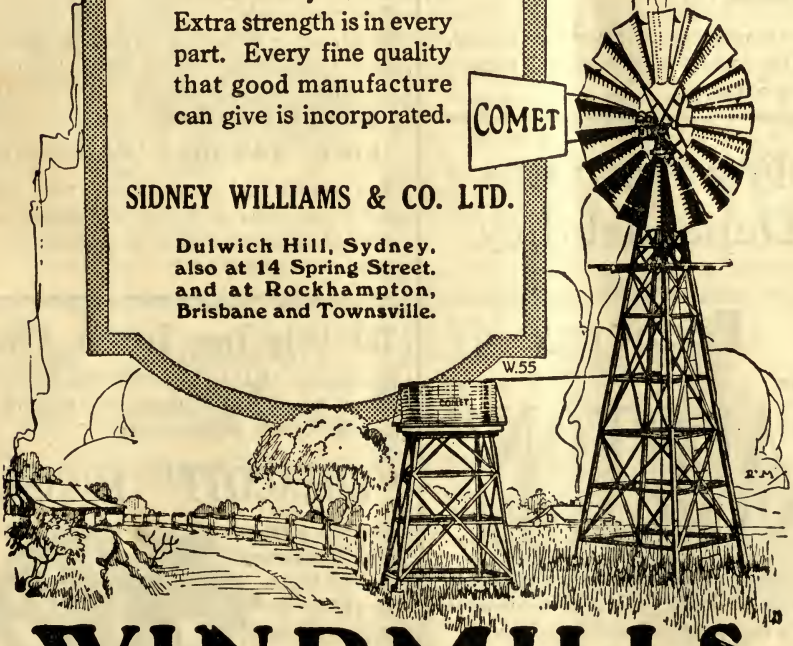
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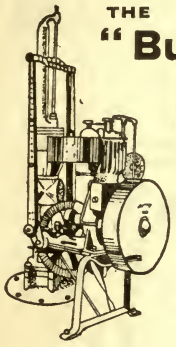
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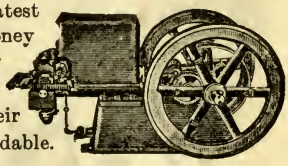
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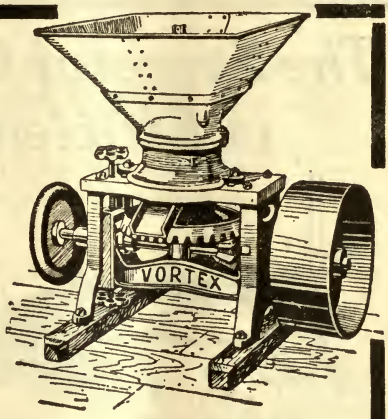
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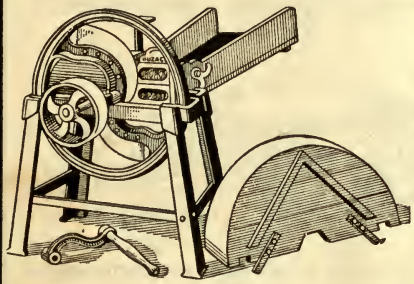
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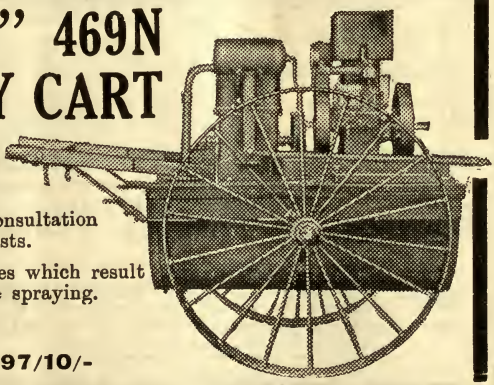
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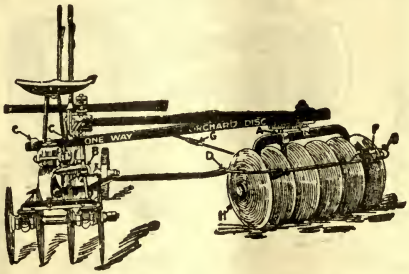
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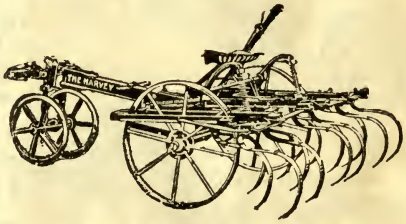
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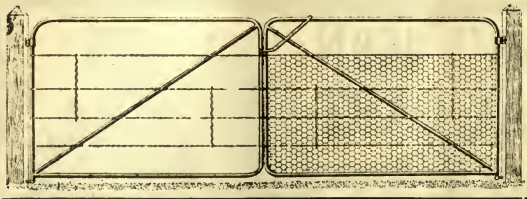
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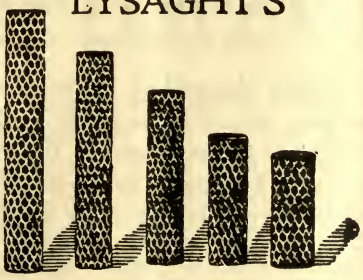


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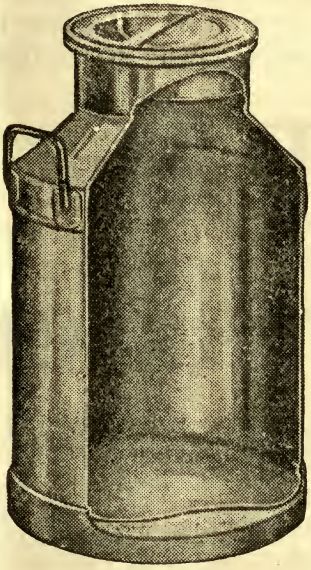
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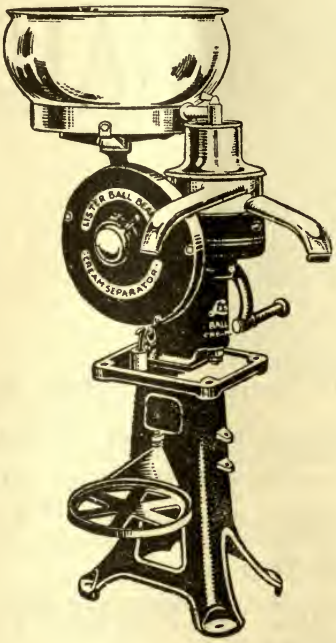
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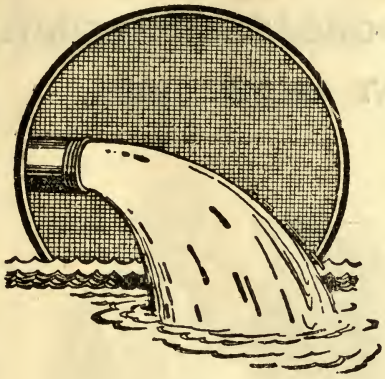
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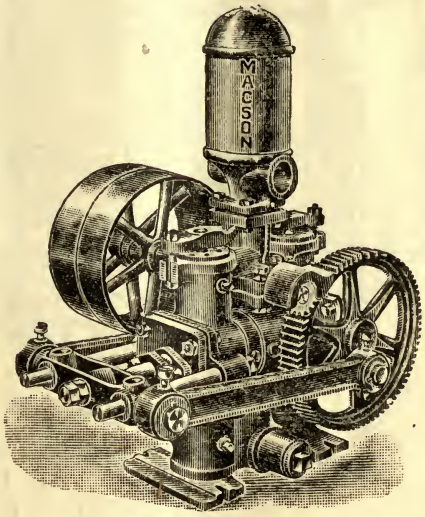
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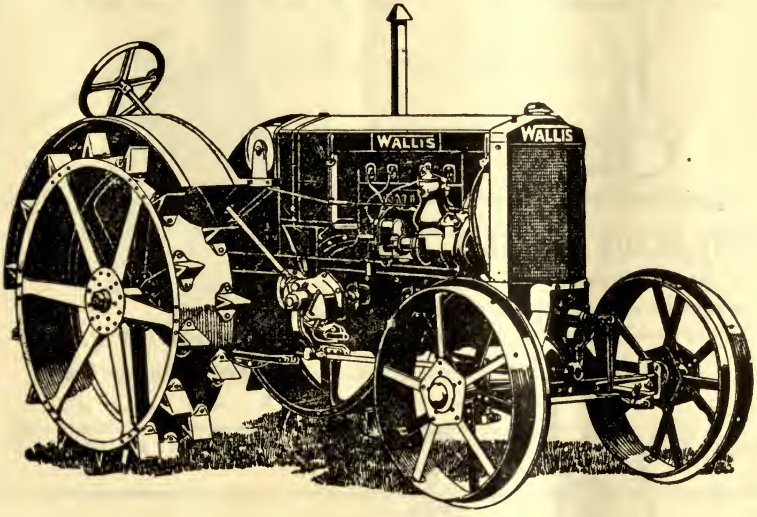
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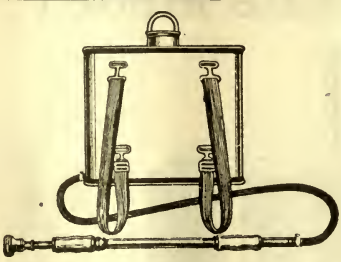
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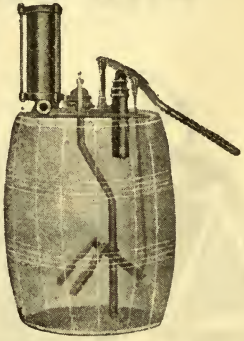
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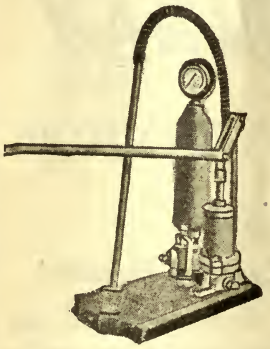


Fig. 507 Pump.

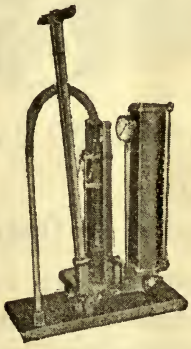
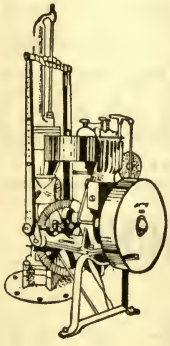


Fig. 513 Pump.

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4 in. Mesh	**33/6**	**34/8**	**37/6**	**41/6**	**44/-** each
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Other Widths can be supplied if required.

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30 in.	3 in.	**35/6**	**29/6**	**24/-**	**20/-**
36 in.	3 in.	**41/-**	**33/6**	**29/-**	**23/-**
42 in.	3 in.	**46/6**	**38/6**	**32/6**	**26/6**
48 in.	3 in.	**53/6**	**44/-**	**38/-**	**30/6**
24 in.	4 in.	**24/6**	**22/-**	**17/6**	**14/6**
30 in.	4 in.	**28/6**	**25/6**	**20/-**	**17/-**
36 in.	4 in.	**33/-**	**29/6**	**23/6**	**19/6**
42 in.	4 in.	**38/6**	**34/-**	**27/-**	**22/6**
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Galvan., per ton	**£17/9/3**	**£17/9/3**	**£18/0/0**

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Guinea	£24/15/-	£25/5/-	£25/15/-	

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Open case lots cost extra.

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Linseed Oil Meal

Vol. XLIV. Part 11. *NOVEMBER* 1, 1933.

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1st November, 1933.

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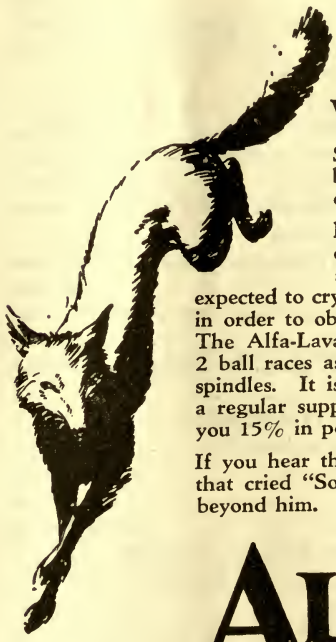
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THE "SOUR GRAPES" STORY



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If you hear the Alfa Spindle decried, remember the fox that cried "Sour grapes" when he found that they were beyond him.

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SEPARATOR CO. LTD

299 Sussex Street :-: Sydney

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Please send me particulars of your Separators: 13-50 gal. Capacity, Plain-Bearing, or 70-165 gal. Capacity, Ball-Bearing, with full details of your easy payment terms.

NAME.....

VOL. XLIV. PART 11. NOVEMBER 1, 1933.
Agricultural Gazette of New South Wales.

Glass-houses Here and Abroad.

SOME INTERESTING COMPARISONS.

JOHN DOUGLASS, H.D.A., H.D.D., Senior Agricultural Instructor.

THE chief glass-house districts of U.S.A. are situated in densely-populated industrial centres, or in the northern states where the population during the winter depends upon the southern states for vegetables. In Canada the houses are situated in the thickly-populated areas. The chief glass-house tomato-growing district of England is Lea Valley, which is on the outskirts of London. During my recent trip abroad I spent some time investigating the types of houses built in each of these countries, the crops propagated, the research and cultural methods followed, and the business side of the industry.

In New South Wales and South Australia the chief crop grown under glass is the tomato. I was interested in the fact that glass-house tomato



A Type of House Suitable for Australian Conditions.

Note the lightness of construction, ample ventilation, wide doors to allow entry of vehicles, high side walls and dwarf concrete foundation wall. The overhead irrigation and heating pipes are also visible.

growers in other countries obtained on the average about twice the yield of our local growers. There are many factors which contribute to the better results obtained abroad.

Type of House a Big Factor.

The type of glass-house, more than any other factor, influences yields. In U.S.A. and Canada there are many types, the chief ones being known as the "ridge and furrow" structures and "super" glass-houses. In England

the greatest area under glass is covered with ridge and furrow types. This type, although not known by that name, is very common in Australia, but differs in many important points from those in England.

The area covered by individual houses abroad is very much greater than here, and it is an advantage in that it helps to maintain a much more even temperature and better air conditions. Another important point of difference is in regard to solidity of structure. Despite all that has been said about the climate in Australia not being cold enough to warrant expensive houses, my contention is that if the industry is to be established on a permanent basis and payable results are to be ensured over a number of years, it is just as necessary to have solidly-built houses here as it is in England.

The time is long past in Australia when growers could build a very light cheap structure and be sure of excellent returns. As in every other country



A Battery of Glass-houses in Ohio Covering 1¼ acres.
The heating and sterilising plant chimney on the right is 100 feet high.

of the world Australian growers must look on glass-house culture as a stable business proposition and not as a get-rich-quick scheme. In Canada and U.S.A. growers are content to obtain returns from their investments which will cover expenses, give the operators a fair salary and return about 15 per cent. on the capital invested. It is very doubtful if, on the average, the industry in Australia pays as well as this, even with our comparatively good climatic conditions, cheaper houses, low running costs, etc.

Permanent Structures Favoured.

Houses in other countries are built as permanent structures, and although a certain amount of upkeep is involved, they last indefinitely. Overseas growers, unlike our local men, cannot under these circumstances, give consideration to a change of soil by moving the houses to fresh ground. They maintain soil fertility by practising crop rotation and manuring, and keep the soil and houses free of diseases and pests by sterilising and adopting



A Typical Steel-pipe Frame Glass-house in Ohio.
Note the heating pipes on the walls and the ridge ventilation.



This Glass-house is Twenty-five Years Old.
It is of the ridge-and-furrow type and is without posts.

hygienic cultural methods. I inspected several overseas glass-houses twenty-five years old and found them unimpaired by age and more up-to-date than anything in New South Wales at the present time. The initial cost of these permanent glass-houses is a good deal more than that of temporary structures, but the initial cost is practically the only cost.

At the present time the most progressive growers in New South Wales are doing fairly well with cheap structures, but will have great difficulty in maintaining payable returns when the houses deteriorate. The only good point about these temporary structures is their cheapness; the defects are numerous.

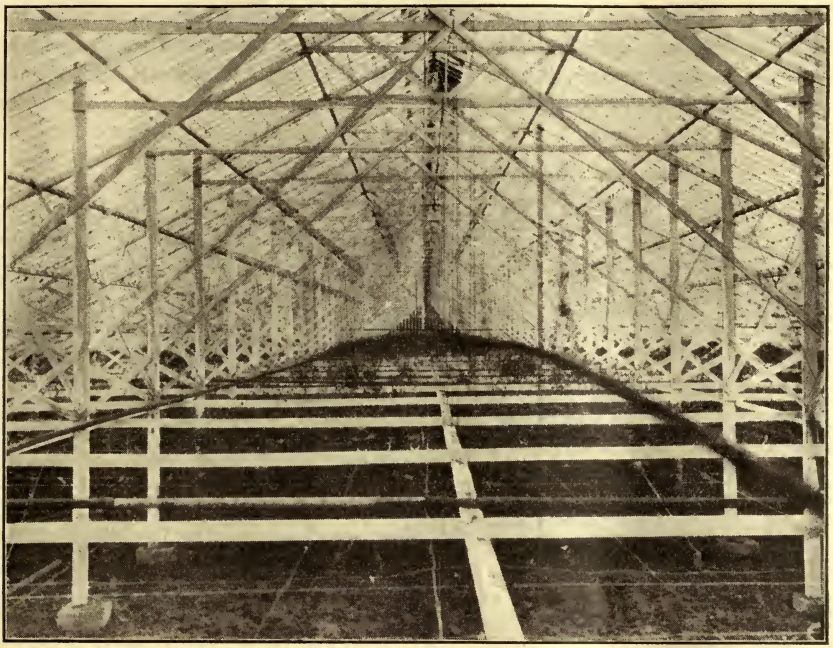


Typical English Glass-houses.

Disadvantages of Temporary Houses.

In the first place, owing to lack of heating facilities, faulty ventilation, structural defects, etc., we are strictly limited in the range of varieties of tomatoes which can be grown. Tomatoes which will withstand low and varying temperatures, and those which pollinate at a low temperature, are the only ones that can be successfully cultivated. The better-quality, heavier-yielding types are unsuited by the conditions in our type of glass-house. Furthermore, the fact that the standard height of the walls of local glass-houses is only 4 feet prevents the growing of tall varieties.

The heavy losses occasioned by Irish blight each year in New South Wales are due in a large measure to the faulty construction of the houses. Several of the leading growers in Ohio (U.S.A.) had never heard of this



Super Type of Glass-house in Canada.
Note the men standing under the cross girders, also tomato plants showing above the girders, which are ten feet from the ground.



The Latest Type of American Glass-house.
Being built for the New York State Department of Agriculture.

disease. Nematodes are more serious in Ohio tomato fields than in our tomato districts, but the trouble is reduced to a minimum in their glass-houses, as are certain fungous diseases (including Fusarium), by adopting soil sterilisation as a routine practice.

Finance is a Stumbling Block.

Even after inspecting several thousand of acres of glass-houses in America and Europe, it is difficult to decide upon the ideal type for conditions in this country. The one and only factor which prevents a definite decision being made is the question of cost. The situation of the land on which the house is to be built will, of course, also considerably influence the decision as to the best type of house to construct. Undoubtedly the steel framed, artificially heated, super type of glass-house is the ideal. I had the good fortune to see one being built for the New York State Department of Agriculture. The accompanying photograph will give you some idea of the completeness of this structure.

For growers with a fair amount of capital I consider that modifications of the superstructure type would give excellent results in this country. Those already in the industry, however, are recommended, for the present at any rate, to make a further outlay to improve their existing houses rather than to invest in the more expensive types.

Some Desirable Features.

The ideal glass-house should embody the following features, thus making it possible to grow, each season, heavy-yielding crops of tomatoes of the best quality.

In the first place the house should be as nearly air-tight as possible. This gives the operator satisfactory control over temperature and humidity. An air-tight house prevents the escape of warm air during the night and thus maintains a higher temperature more economically than does a leaky house. Air-tightness also allows of effective fumigation.

The next consideration in deciding upon the ideal for Australian conditions is the matter of adequate ventilation. The health of the plants depends a good deal upon ventilation. At present during the winter months the practice is not to ventilate, and the plants are saved from serious damage and even total destruction only by "accidental" ventilation through the glass cracks, channels of the rafters, etc. Even in snowy, winter weather overseas growers make a point of ventilating the houses as often as necessary. The fact that these houses are heated does not make this operation any more necessary than in our temporary structures.

The wall heights of overseas houses vary considerably, but the average is somewhat higher than our tallest. The larger glass-houses in America have a standard 8 feet wall. I consider that the ideal Australian type should have walls at least 6 feet high. The extra expense incurred will be well repaid by the ease of working and the many other obvious advantages.

Another noticeable feature in all overseas glass-houses was the low concrete or brick foundation wall. This wall varied in height, and could, with advantage, be incorporated in designs for this country, especially as concrete is relatively cheap. In the first place this concrete foundation wall eliminates rotting of the wooden bottom wall plates. Its chief advantage, however, lies in the fact that it is more effective than other materials in excluding frost and cold air, which is coldest at ground level. In the case of our present structures the cold gains entrance through cracks and by direct radiation through the glass. Another advantage is its permanency and negligible cost of upkeep as compared with renewal charges where the wooden structure rests on the ground.

The construction of glass-house roofs, guttering, etc., in the modern types of glass-houses is very efficient. In the first place, only the best seasoned wood glazing bars are used. The glass is puttied in with elastic (non-hardening) putty so as to make a rainproof roof. Along the inside of the rafter small furrows (or gutters) are made in order to carry off the water which condenses on the inside of the glass. This makes the roof drip-proof. Trussing of the roof should always be carried out with the object of eliminating as many posts as possible.

(*To be continued.*)

Applications Invited for the Government Farrer Scholarship.

The Government Farrer Scholarship, tenable in the Agriculture Diploma Course at Hawkesbury Agricultural College, Richmond, will be open for competition in January next.

The award of the scholarship will be made on the results of the Intermediate Certificate Examination, subject to consideration of the candidate's aptitude, fitness, physical strength and other qualifications necessary to become successful in agricultural work. The award will be made on the aggregate marks obtained in six subjects at the examination in question, such subjects to include English, Mathematics 1, and four others to be selected from specified groups. The scholarship will be open for competition to candidates who are not less than 16 nor more than 19 years of age on 1st February, 1934, and who are natural born or naturalised subjects of the King. Candidates or their parents must have had six months' continuous residence in this State immediately prior to 1st February next. The duration of the scholarship is three years in the case of a holder entering the first year, and two years where he is qualified to enter the second year of the course, and will cover fees, cost of text-books and other expenses up to a maximum of £40 per annum. Any charges or expenses in excess of that amount will require to be met by the student.

Applications from persons desirous of competing for the scholarship must reach the Principal not later than 5th January, 1934. Further particulars are obtainable from the Under-Secretary, Department of Agriculture, Box 36A, G.P.O., Sydney, or from the Principal, Hawkesbury Agricultural College, Richmond.

Potato Cultivation Often Overdone.

Local Progressive Methods in Line with Overseas Ideas.

The harmful effects of deep inter-row cultivation of the potato crop has frequently been noted in this State during dry seasons, stated Mr. A. J. Pinn, Special Agricultural Instructor, recently. Main crop growers, particularly in the western and southern districts of this State, have arrived at the conclusion that frequent shallow cultivations during the early stages of growth are of prime importance. A review of the methods adopted by the competitors in potato crop competitions over a number of years reveals the fact that most of these growers also practise frequent, early and level cultivations. These workings are effected chiefly by the use of harrows when the crop is breaking ground, and even when the plants are 8 to 10 inches high.

Evidence as to the progressiveness of these methods is contained in a recent issue of *The American Potato Journal*, from which the extracts below are reprinted, and which states that the more frequent use of the weeder early in the season, or until the plants are 8 to 10 inches high, and less inter-row cultivation are now recommended to growers throughout New York State. This has been proven to be both cheaper and more effective than the present system of weed control.

The Primary Object of Cultivation is to Kill Weeds.

The proper cultivation of potatoes is an art dependent on good judgment and a knowledge of the general principles involved, rather than a science which can be reduced to set rules. From the previous generation of soil scientists we inherited a number of theories, such as the conservation of soil moisture by a surface mulch, stimulation of soil bacteria and nitrification through the aeration of the soil, and so forth. These could be demonstrated in the laboratory, but most of them somehow failed to prove out in field experiments, which are the real and final test of any theory. In repeated experiments with corn, and more lately on Long Island (U.S.A.), with potatoes, cultivation has caused a decrease as often as an increase compared to plots where the weeds were simply scraped off with a hoe and the soil never stirred. Where the weeds were allowed to grow yields were naturally extremely low.

When all is said we come back to the original idea of cultivation, namely, that the primary object is to kill weeds. Some form of cultivation is, so far, the only economical means of weed-killing devised. If weed growth is controlled, in the rows as well as between them, further stirring of the soil will apparently accomplish little, and often reduces the yield, though there is some evidence that in years of extreme drought, like 1930 (in U.S.A.), it may be slightly beneficial.

Why Cultivations Should be Early and Shallow.

Someone has suggested the term "birth control" for the killing of the first few crops of weeds, through the use of the harrow and weeder, before the potatoes are above ground. The time to kill weeds is while they are small

and weak, not after they have become firmly established and deeply rooted. The spike harrow or weeder also gets over the ground much more rapidly than the row cultivator. Where the seed pieces are planted fairly deep the harrow can be run deep enough to loosen the surface soil thoroughly, and can even be used after the potatoes are up with little or no damage. In 1928 the Pennsylvania 400-Bushel-Club members harrowed an average of 2.3 times, some as many as four times.

The first inter-row cultivation may be, and under some conditions should be, deep and fairly close in order thoroughly to loosen up the soil compacted between the rows in planting, and to allow heavy rains to penetrate rapidly. As soon as the roots begin to spread out, however, especial care should be taken to prevent root injury. Tearing off roots is a mutilation of the plant which will check and sometimes permanently injure its development. When good-sized potatoes are cultivated closely or deeply, the whole field may sometimes be seen to wilt in the hot sun, even though the soil is not very dry. Such cultivation does more harm than it can possibly do good.

When wet weather has prevented normal cultivation until weeds have attained some size, a set of sweeps will cut the weeds below the surface, but need not be run deep enough to tear the potato roots severely. Otherwise, deep and damaging cultivation will be necessary.

Is the Value of a Soil Mulch Over-emphasised?

Writing in this same journal, E. V. Hardenburg, of the Cornell University (N.Y.), suggests that the primary function of cultivation is weed control. Increase in potato yields resulting from the maintenance of a soil mulch to conserve soil moisture, he says, has been over-emphasised. This has been shown, he claims, by the results of recent experiments reported by the Cornell University and the Pennsylvania Experiment Station. In both of these experiments, running four to five years, plots receiving three to five cultivations yielded as well as plots cultivated eight or more times. Similarly, plots in which the soil was never stirred and weeds were controlled by scraping or cutting yielded as well or better than the cultivated plots. The conclusion is that cultivation may be overdone, particularly during periods of drought, where weed control does not require it, and late in the season when tillage results in serious root damage.

After dealing fairly exhaustively with the subject, Hardenburg arrives at the conclusion, based on the results of recent experiments, that it usually pays best to cultivate potatoes only a sufficient number of times to control weeds effectively, and that the best potato grower is not the one who cultivates most often, but rather the one who handles his weed problem with fewest cultivations and at lowest cost.

Ridge versus Level Cultivation.

Another debated point, says J. B. R. Dickey, of Pennsylvania State College, is as to whether potatoes should be ridged or hilled up. Practically all cultivation experiments (in U.S.A.) show better yields from level cultivation, as less moisture is lost by evaporation and the roots are less

disturbed. If weeds in the row have been allowed to develop beyond the stage where the weeder will kill them, they may sometimes be smothered by ridging. Again, if there is danger of the tubers pushing out and getting sunburned, it may be well to throw some dirt to the row. In either case, ridging should be regarded as an evil which may or may not be necessary. There is much less excuse for ridging with late potatoes, which if planted well down in the ground will not set close enough to the surface for exposure to be serious. Ridged potatoes are doubtless easier to dig, but something is usually, if not always, sacrificed in yield to gain this advantage.

Writing in reference to the same subject, Hardenburg says that although ridging does not appear to have a large influence on the amount of sunburn injury, the study of 105 farms in 1931 and 171 in 1932 showed consistently less injury in those fields ridged highest. In view of the fact that extreme ridging, applied when the plants are large and growing rapidly, usually results in loss of soil moisture, much root damage and ultimately reduced yields, it should be done only late in the season after the plants are nearly mature. If it appears necessary to ridge earlier in order to take care of surface water on the heavier soils, the ridge should be broad or the furrow narrow. Another suggestion is that deeper planting will result in the tubers forming at a lower level with a consequent reduction in sunburn injury.

The Importance of Clovers in a Pasture.

The value of clovers as a constituent element of pastures is well recognised. They not only enhance the general fertility of the soil, improve its texture, and darken its colour, but in so doing they indirectly improve the growth of the grasses growing in association with them. This is particularly true in regard to those grasses which require a reasonably high standard of soil fertility—grasses that, in general, are the more valuable among our grazing plants. The clovers are, furthermore, richer in food materials than are the grasses; not only richer in proteins, but also in many essential minerals. The significance of these facts is the more apparent when the grasslands of Australia are considered in relation to mineral deficiency. Minerally-deficient pastures are characteristically devoid of pasture legumes, and it is interesting to note that when soil and other conditions become conducive to the growth of clovers, mineral deficiency quite often becomes corrected, at least in so far as evident symptoms in the health of stock are concerned. An adequate proportion of clover in any pasture must be regarded as being essential to the well-being of the grasses in that pasture as well as to the health of the live stock that browse upon it.

The foregoing is an extract from a report on the dairy pastures of Australia, by Mr. William Davies, of the Aberystwyth Plant Breeding Station, Wales, who recently spent a year in Australia carrying out pasture investigations.

Growing Green Peas on Trellises.

A New Method with many Advantages.

A. C. ORMAN, H.D.A., Agricultural Instructor.

On the coast, particularly in the Gosford and Dora Creek districts, the growing of green peas on trellises is a common practice, and is particularly suitable for small growers in these and similar districts.

The advantages claimed for this system are many. The yields are increased, picking is rendered easier, less disease is present on the haulms, the rows are more easily cultivated and kept free of weeds, and the plants are not affected so much by continued wet weather.



A Crop of Green Peas on Trellises.

The method of constructing the trellis is as follows:—Stout stakes 5 feet long are driven 6 inches into the ground at intervals of about 20 feet along the rows. As the peas grow, horizontal wires a little thicker than tie wire are alternately spaced on both sides of the stakes every 6 or 8 inches, or in pairs at the same distance, up to a height of 4 feet 6 inches, according to the growth of the vines. The wires are strained to stout short pegs at each end of the rows. The rows are usually spaced about 4 feet apart. Yields of up to 400 bushels per acre have been obtained by this method, according to reports.

A modification of the method, and one often employed by backyard vegetable growers, is to use sticks and bushes to support the plants.

What is Certified Potato Seed?

Why Individual Growers Cannot Have Their Seed Certified.

A. J. PINN, H.D.A., Special Agricultural Instructor.

What is meant by certified potato seed? Can I have my potatoes certified? These and similar questions are often received by the Department from potato growers, particularly those who have taken the trouble to select and otherwise build up a line of seed potatoes that is true to type and very free from virus and other diseases and pests.

Unfortunately there are many obstacles in the way of officially certifying seed on behalf of individual growers. For instance, an inspector may certify that a certain crop is up to the standard as regards freedom from



A Handy Potato Grading Table.

disease, etc., but it would be difficult to guarantee that all the seed bagged or offered for sale by that grower came from the crop previously inspected. On the other hand, with the aid and co-operation of properly constituted potato growers' associations, adequate check can be kept on these matters, and it is the knowledge of these safeguards which tends to build up confidence in the minds of buyers. It has to be remembered by those who have

good quality seed potatoes to dispose of that it is not sufficient for the grower himself to be convinced of the excellence of his own seed; he has to convince the buyer.

Thus we have the main reasons why individual growers cannot have their potato seed officially certified.

How to Form a Potato Growers' Association.

As the growing of seed, on a commercial scale at any rate, will be limited to certain potato-growing districts, growers anxious to have their seed certified are advised to solicit the co-operation of their fellow-growers in the formation of a local growers' association. Model rules for such a body are printed on the following pages. Incidentally, these rules also specify the various standards for different certified grades of potatoes.

MODEL CONSTITUTION OF A POTATO GROWERS' ASSOCIATION.

TITLE.

1. The name of the association is "The Potato Growers' Association.

HEADQUARTERS.

2. The headquarters of the association shall be at in the State of New South Wales.

OBJECTS.

3. The objects of the association shall be—

(*a*) To carry out the grading and labelling of the potatoes of members.

(*b*) To promote and further the interests of members in the production and marketing of potatoes.

(*c*) To sell or arrange for the sale, distribution, or marketing of the potatoes of members.

(*d*) To do all things necessary, incidental, or conducive to these objects.

(*e*) To construct, maintain, and alter any buildings or works necessary or convenient for the purposes of the association and its members.

(*f*) To employ or engage workmen, officers, etc.

POWERS.

4. (*a*) To carry out objects of the association.

(*b*) To suspend, disqualify, or otherwise deal with any member for failing to comply with any rule of the association, or doing any matter or thing which in the opinion of the association is contrary to its principles or objects.

CONTROL.

5. The control of the affairs of the association and the exercise of all its powers shall be vested in an executive consisting of seven of its members.

OFFICERS.

6. (*a*) The officers of the association shall consist of a President, Vice-presidents, Secretary, and Treasurer.

(*b*) All officers shall be elected at the annual general meeting and shall hold office until the end of the next annual general meeting or until the appointment of their successors.

(*c*) Should a vacancy occur in any office it shall be filled at the next meeting of the executive.

MEETINGS.

7. The annual general meeting of the association shall be held at in each year or on such other day as the executive shall determine. The executive shall meet at such times as are fixed by the secretary.

MEMBERSHIP.

8. The membership of the association shall be open to all bona fide potato growers who are financial members of the Farmers and Settlers' Association, Primary Producers' Union, or Agricultural Bureau, and who have an area of not less than 3 acres planted to potatoes at the date of application for membership.

SUBSCRIPTION.

9. The annual subscription payable by each member shall be as fixed by the association at each annual general meeting, and shall be paid not later than in each year.

GRADING AND INSPECTION OF POTATOES.

10. (*a*) Each member of the association, unless exempted by it, shall submit the potatoes grown by him for the inspection of an inspector appointed by the association.

(*b*) Before the inspection of the potatoes intended for seed of any member, the association may require such member to furnish a statutory declaration to the effect that the potatoes to be inspected are a part of the crop which has been inspected by an officer of the Department of Agriculture of New South Wales and certified by him to be "certified" or "standard" seed.

(*c*) After the inspection of the potatoes of any member, the inspector may affix to the bag or bags containing same a label in one of the prescribed forms. Such label shall only be affixed if the potatoes conform to the requirements set forth in Rule 11.

(*d*) There shall be payable by a member, the inspection fee fixed by the association in respect of every bag of potatoes inspected for him.

(*e*) Each member shall, on or before the thirty-first day of December in each year, furnish to the secretary of the association particulars of the area and variety of potatoes which the member intends to submit for the inspection of the Department of Agriculture of New South Wales for the purpose of seed certification.

LABELLING OF POTATOES.

11. (*a*) *Table Potatoes.*—A label will not be affixed by the association's inspector to any potatoes intended for table use unless they comply with the provisions of the grading regulations for potatoes made under the Plant Diseases Act, 1924, of New South Wales. When the inspector is satisfied that the potatoes comply with the above requirements he shall affix to the bags containing same a label in the form prescribed hereunder.

.....POTATO GROWER'S ASSOCIATION

OFFICIAL LABEL

GRADED TABLE POTATOES

Variety

Size

Grown by of

It is hereby certified that the potatoes contained in this bag have been inspected by the association's inspector and are hereby guaranteed to be* grade.

Dated this day of 193 .

.....Inspector.

* Here write either No. 1, No. 2, New Potato or Chat.

(*b*) *Seed Potatoes.*—A label will not be affixed by the association's inspector to any seed potatoes unless—

(i) They comply with the provisions of the grading regulations for potatoes made under the Plant Diseases Act, 1924, of New South Wales, and
(ii) they are free from deep pits and not affected with surface scab over more than one-sixteenth of the surface area of the potato, which in no case shall affect the eyes of the potato;
(iii) the eyes of the potatoes have not grown out from the main tuber;
(iv) they are of even shape and are not less than 1½ oz. or more than 12 oz. in weight;
(v) they do not contain more than 2 per centum varietal impurities;
(vi) the crop from which the potatoes have been obtained has been inspected by an officer of the Department of Agriculture of New South Wales and certified by him to be "standard" or "certified" seed potatoes.

When the association's inspector is satisfied that the above-mentioned requirements have been complied with, he shall affix a label to the bags containing the potatoes.

"CERTIFIED" SEED LABEL (BLUE).

In the case of seed potatoes obtained from a crop which has been certified by an officer of the Department of Agriculture of New South Wales to be "certified" seed potatoes, the label shall be in the following form:—

_____ POTATO GROWERS' ASSOCIATION

OFFICIAL LABEL

CERTIFIED SEED POTATOES

Variety_____

Size _____

Grown by_____

IT is hereby certified that the potatoes contained in this bag have been inspected by the Association's Inspector, and are guaranteed to be certified seed potatoes.

Date_____ Inspector.

(Front of Label.)

The crop from which this seed has been obtained has been duly inspected by an officer of the Department of Agriculture of N.S.W., and meets with the prescribed standards relative to freedom from disease and varietal purity.

No liability as to the quality, condition, etc., of the contents of this bag will be recognised unless complaint be made in writing to the Secretary of the Association within three days of the original purchaser taking delivery of same.

(Back of Label.)

ALTERATION OF RULES.

The association may at any time make new rules and vary or delete existing rules.

"STANDARD" SEED LABEL (RED).

In the case of seed potatoes obtained from a crop which has been certified by an officer of the Department of Agriculture of New South Wales to be "standard" seed potatoes, the label shall be in the following form:—

.....POTATO GROWERS' ASSOCIATION

OFFICIAL LABEL

STANDARD SEED POTATOES

Variety.....

Size

Grown by.....

IT is hereby certified that the potatoes contained in this bag have been inspected by the above Association's Inspector, and are hereby guaranteed to be standard seed potatoes.

Date..... Inspector.

(Front of Label.)

The crop from which this seed has been obtained has been duly inspected by an officer of the Department of Agriculture of N.S.W., and meets with the prescribed standards relative to freedom from disease and varietal purity, except that it does not attain the requisite freedom from virus infection to obtain a full certificate, but the crop was well grown, and well above average in health and vigour.

No liability as to the quality, condition, etc., of the contents of this bag will be recognised unless complaint be made in writing to the Secretary of the Association within three days of the original purchaser taking delivery of same.

(Back of Label.)

THE Department has a number of leaflets available on different aspects of vegetable growing—cultural, insect and pest control, and fertilising. The tities of these free leaflets are set out in the "List of Publications," copies of which are also available for the asking.

Pure Seed.

Growers Recommended by the Department.

The Department of Agriculture publishes monthly in the *Agricultural Gazette* a list of growers of pure seed of good quality of various crops in order to encourage those who have been devoting attention to this sphere of work, and to enable farmers to get into direct touch with reliable sources of supply of such seeds.

A grower's name is added to the list only (1) after the crop has been inspected during the growing period by a field officer and favourably reported upon, and (2) after a sample of the seed has been received by the Under-Secretary, Department of Agriculture, Sydney, and has satisfactorily passed a germination test.

Intending purchasers are advised to communicate direct with growers regarding the price for the seeds mentioned hereunder. In the event of purchasers being dissatisfied with seed supplied by growers whose names appear on this list, they are requested to report immediately to the Department.

Pure seed growers are required to furnish each month a statement of the quantity of seed on hand. Such statement must reach the Department, Box 36a, G.P.O., Sydney, not later than the 12th of the month.

Maize—

Fitzroy	... Manager, Experiment Farm, Grafton.
Funk's Yellow Dent	... J. A. L. Thompson, "Deep Water," South Gundagai.
Golden Beauty ...	... W. R. Mitchell, Lower Towamba, via Eden.
Ulmarra Whitecap	... J. Flanders, Ulmarra.
Wellingrove ...	... Manager, New England Experiment Farm, Glen Innes.

Sorghum—

Cowper	... Principal, Hawkesbury Agricultural College, Richmond.
Oxley	... Manager, New England Experiment Farm, Glen Innes.
Saccaline	... F. J. D. Doust, Lynn Farm, Camden.
White African ...	... Manager, Wollongbar Experiment Farm, Lismore. Manager, Experiment Farm, Grafton.

Potato ("Certified" and "Standard" Seed)—

Carman	... Secretary, Potato Growers' Association, Millthorpe.
Early Carman ...	... Secretary, Potato Growers' Association, Millthorpe.
Early Manhattan	... Secretary, Potato Growers' Association, Millthorpe. Secretary, Potato Section, Rural Co-operative Society Ltd., Orange (certified seed only).
Factor	... Secretary, Potato Growers' Association, Millthorpe. Secretary, Potato Section, Rural Co-operative Society Ltd., Orange (certified seed only). Secretary, Potato Growers' Association, Taralga.
Late Manhattan	... Secretary, Potato Section, Rural Co-operative Society Ltd., Orange.

Cucumber—

Early Fortune ...	... W. Parry, Terrigal.
Crystal Apple ...	... E. F. Ritter, Wyong.

Beans—

Tweed Wonder ...	... W. T. Sunderland, Bunglegumbie road, Dubbo. E. S. Green, Whylandra Creek, Dubbo. Superintendent, Riverina Welfare Farm, Yanco.

Tomato—

Improved Sunnybrook Earliana ...	... A. Sorby, Macquarie Fields.
Break-o'-Day ...	... A. Sorby, Macquarie Fields. Manager, Experiment Farm, Bathurst.

Tomato—continued.

Bonny Best	Manager, Experiment Farm, Bathurst. P. Morandini, "Riviera," Bunglegumbie-road, Dubbo.
Marglobe	Manager, Experiment Farm, Bathurst.
Norton	

Sweet Potato (rooted cuttings)—

Porto Rico	S. Redgrove, "Sandhill," Branxton. Superintendent, Narara Viticultural Nursery, Gosford.
Nancy Hall	S. Redgrove, "Sandhill," Branxton. Superintendent, Narara Viticultural Nursery, Gosford.
Southern Queen ...	S. Redgrove, "Sandhill," Branxton. Superintendent, Narara Viticultural Nursery, Gosford.
Ashburn	S. Redgrove, "Sandhill," Branxton. Superintendent, Narara Viticultural Nursery, Gosford.
Wannop	S. Redgrove, "Sandhill," Branxton. Superintendent, Narara Viticultural Nursery, Gosford.
Pierson	S. Redgrove, "Sandhill," Branxton. Superintendent, Narara Viticultural Nursery, Gosford.
Triumph	Superintendent, Narara Viticultural Nursery, Gosford.
Yellow Strasburg ...	Superintendent, Narara Viticultural Nursery, Gosford.
Vineless	Superintendent, Narara Viticultural Nursery, Gosford.
Farmer's Special ...	S. Redgrove, "Sandhill," Branxton.
Narrow Leaf Jersey ...	S. Redgrove, "Sandhill," Branxton.

Asparagus—

Lady Washington ...	Manager, Experiment Farm, Bathurst.

Melon—

Red Seeded Citron ...	Principal, Hawkesbury Agricultural College, Richmond.

Squash—

Banana	Principal, Hawkesbury Agricultural College, Richmond. C. J. Rowcliff, Old Dubbo road, Dubbo.

Watermelon—

Angelo	C. J. Rowcliff, Old Dubbo road, Dubbo.

A number of crops were inspected and passed, but samples of the seed harvested have not been received, and these crops have not been listed.

A Poison Bait for Ants.

The following poison bait is recommended for the common black ant and the sugar ant:—

(*a*) Sugar, 4lb.; borax, 1oz.; water, 4 pints. Boil together for fifteen minutes and then allow to cool.

(*b*) Arsenite of soda (80 per cent. arsenious oxide), ½ oz. Dissolve in ½ pint of hot water and let cool.

Mix (a) and (b) and stir in 4oz. of honey.

Pour two or three fluid ounces of the bait into small tins (tobacco or cigarette tins will answer the purpose), and place in the tins small pieces of cloth as a "foothold" for the ants when feeding. Within five or six days the ants generally disappear, the bait having been conveyed to their nest.

As there is a trace of poison in this bait, keep it out of the reach of children and animals.

The Pumpkin Beetle.

Aulacophora hilaris Boisd.

W. L. MORGAN, B.Sc.Agr., Assistant Entomologist.

This article deals with the economic significance, distribution, and food plants of the pumpkin beetle, and describes the structure of the insect in the different stages of its life. A subsequent article will give data on its development and habits, and discuss measures for the control of the pest.

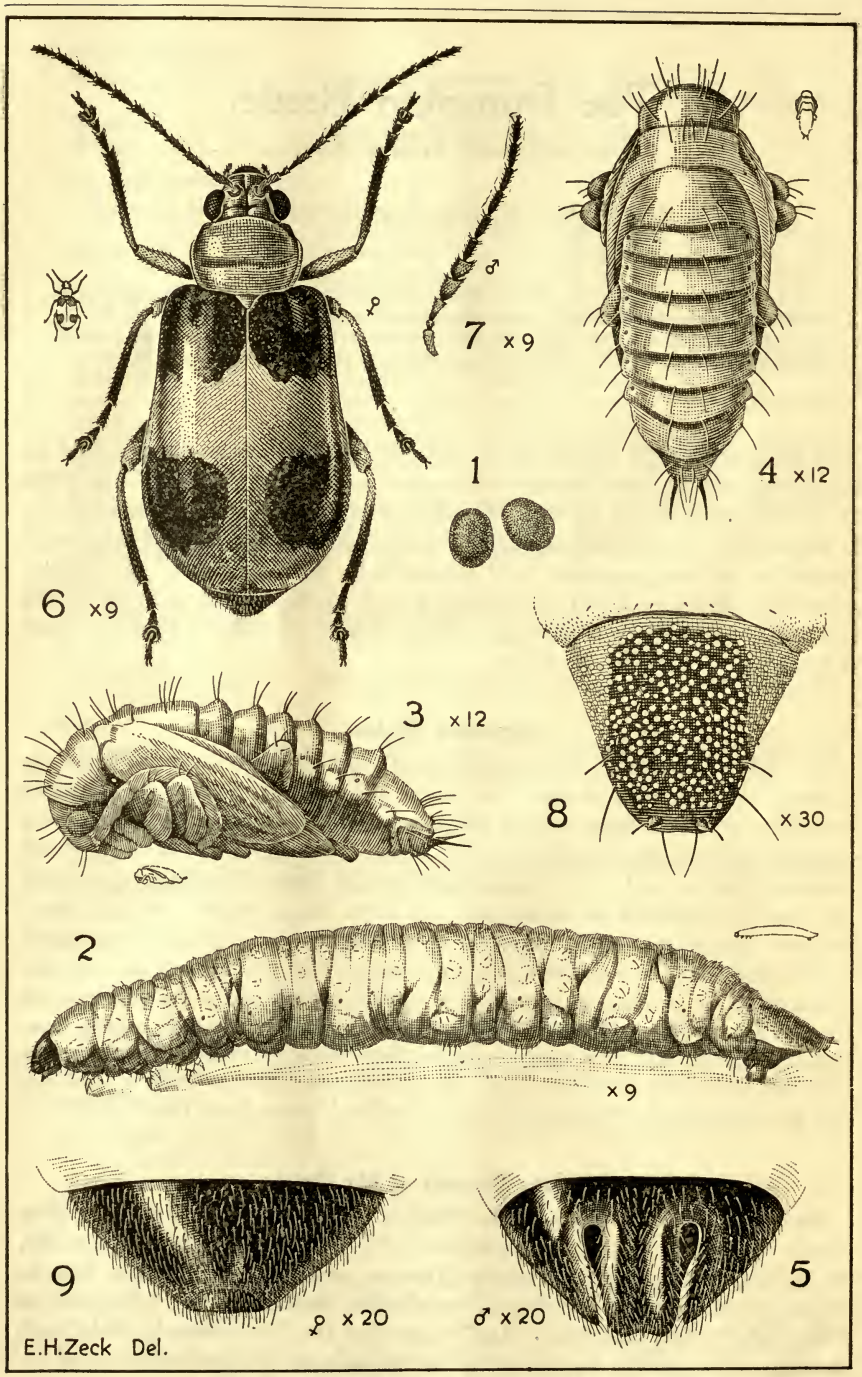
The pumpkin beetle (*Aulacophora hilaris* Boisd.) belongs to a family of leaf-eating bettles, the *Chrysomelidae,* many species of which are crop pests in various parts of the world. The adult, and not the larva of this species, is responsible for the damage done. It attacks the foliage and flowers of pumpkins, melons, squashes, and cucumbers. Twelve species[9] of *Aulacophora* are known to occur in Australia, and whilst several of them attack cucurbits in Northern Australia, *Aulacophora hilaris* is the species of pest importance in New South Wales.

Economic Status.

The losses due to this pest vary from a slight reduction of the crops up to such heavy or total destruction of the plants as to necessitate complete re-sowing. In northern inland portions of the State considerable losses occur each year, particularly in early crops, but every few years a general outbreak occurs, and most of the young spring crops throughout the State are heavily damaged or destroyed. At such times absence of rain may prevent re-sowing, or the re-sown crop may be equally badly damaged. Apart from the severe damage to young crops, older plants may be seriously thinned out or checked in growth. In addition, the beetles are particularly fond of the flowers and young fruit of pumpkins and squashes, and by continually destroying these may cause further losses. Occaionally, where the pest has been very abundant and dry conditions have prevailed, cherries, and even figs, have been attacked, and localised losses have resulted.

Previous Records of the Beetle.

As some doubt existed as to the identity of the species prevalent in New South Wales, specimens were submitted for identification to the late Mr. A. M. Lea, Entomologist, Adelaide Museum, and were identified by him as *Aulocophora hilaris,* Boisduval, originally described in "Voyage de l'Astrolabe," 1832, page 555[12]. Lea[9] states that the description by Boisduval, though short, applies exactly only to the species subsequently named *A. olivieri* by Baly,[10] and *A. australis* by Blackburn.[11]



The Pumpkin Beetle (*Aulacophora hilaris* Boisd.).

1. Egg (X14). 2. Fully grown larva. 3. Pupa, lateral view. 4. Pupa, dorsal view. 5. Last abdominal segment of male, ventral view. 6. Female, dorsal view. 7. Male antenna. 8. Anal shield of larva, dorsal view. 9. Last abdominal segment of female, ventral view.

The earliest published record of *Aulacophora hilaris* occurring as a pest is by A. S. Olliff[1a], who recorded it in 1892 on cucurbits and potato tops. The adult is first figured in this article, and the name "banded pumpkin beetle" is used. W. W. Froggatt[2a] in 1909 briefly described the eggs and newly-hatched larvae, and an accompanying coloured plate figured the adult, the eggs, and the damage caused to pumpkin leaves and cherries. In 1910 Froggatt[2b] described the fully developed larva and the pupa from specimens collected by Gallard from the roots of pumpkin plants at Gosford. Jarvis[5] in 1913 developed the beetle in the laboratory on the roots of marrow, by placing the eggs in moist sand at the roots of the plants. Jarvis figured and described the egg, larva, pupa, and adult. He considered that normally the pumpkin beetle develops on roots of herbaceous plants, and that with ordinary clean cultivation cucurbitaceous roots seldom suffer attack.

Its Distribution.

This species is widely distributed throughout Australia, having been recorded from Queensland,[5] Northern Territory,[6] South Australia,[4] and Victoria,[7] and apparently is regarded in each instance as the major pest of cucurbits. It has been recorded from most districts in New South Wales, but causes greatest losses in the North-west Slopes and Liverpool Plains districts and parts of the North Coast, being more prevalent in northern than in southern areas. It is least numerous in the colder and more elevated regions.

Food Plants.

In addition to all cultivated cucurbits, the pumpkin beetle has been recorded on potato tops (slight damage) and on the leaves and buds of sugar-cane by Olliff[1]; on the False Nightshade (*Solanum nigrum*) and the common dock (*Rumex* sp.) by Fuller[2]; on cherries and stalks of young apples by Froggatt[2b]; on young peach trees by Jarvis[5]; on the leaves and silks of maize by Gurney[8]; and on peaches and nectarines by French.[7]

The following hosts were noted in reports received by the Entomological Branch from growers in 1927-28, when the pumpkin beetle was unusually abundant:—Fig (the ripening fruit), grape, and the blossoms and young pods of beans. Additional host records by the author are lucerne (*Medicago sativa*), very slight damage; the blossoms of eucalypts and variegated thistle (*Carduus marianus*) very commonly, the beetles apparently feeding on the nectar or the pollen, as the blossoms were injured; prickly-pear (*Opuntia* sp.) blossoms, slight damage to petals; and the Paddy Melon (*Cucumis myriocarpus*), a cucurbitaceous plant which appears to be the favourite weed host.

The Nature of the Damage.

The damage to pumpkins, melons, and squashes commences as soon as the plants show through the ground, and although plants of all sizes are attacked, the chief damage is caused during the first three or four weeks of growth. A very young plant, with only the fleshy seedling leaves showing, may be destroyed by half a dozen bettles in the course of a few hours. The

large plant, however, is only seriously damaged or destroyed when many hundreds of beetles attack it, for the reason that the well-grown plant produces large leaves in rapid succession, and thus is able to outgrow the infestation. Usually, once the plant commences to make runners, it is able to withstand further attack.

The beetles feed on the under-surface of the fleshy seedling leaves. The true leaves, while they are young and tender, are attacked from both surfaces; but when they become coarse and older the beetles are at first prevented from feeding on the lower leaf surface by the bristles that occur there; the attack, therefore, usually commences on the upper leaf surface, frequently at the periphery. After a certain amount of damage to the upper surface has occurred, the leaf wilts, and the bristles are negotiated more easily.

On the few occasions where pumpkin bettles have spread to cherries, they fed on the flesh of the ripening fruit, destroying its market value.

Descriptions of the Various Stages.

The Egg.—The egg (see 1 in the accompanying illustration) is .02 to .03 inches in diameter; at oviposition it is bright orange in colour, later becoming paler, sometimes almost white, but turning yellowish-brown just before hatching. The shell is very delicately reticulated, and in the freshly-laid egg is soft and pliable, so that the egg often becomes distorted in shape. The shell, however, soon hardens, becoming fragile and brittle. The eggs are laid singly or in groups; laid singly in damp soil they are irregularly spherical in shape; in groups they tend towards the polyhedral, while on hard, flat surfaces they are considerably flattened.

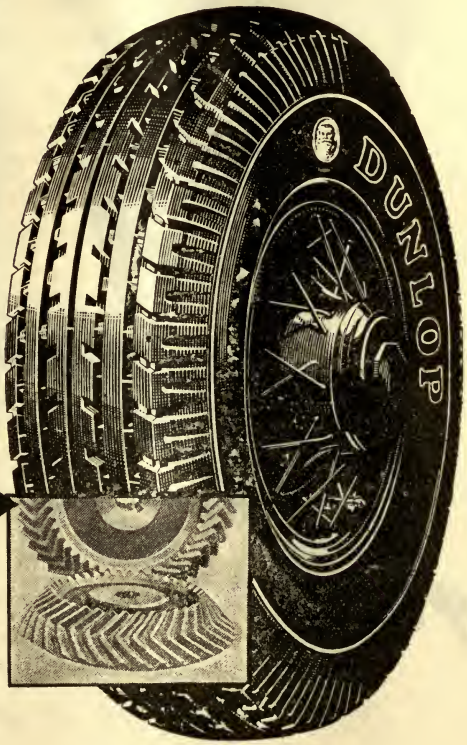
The Larva.—The newly-hatched larva (.05 inches by .012 inches) is slender and light-brown in color. The thoracic region is slightly wider than the head and abdomen, but the body is of general uniform width. The fully-grown larva (see 2 in the illustration) is .4 to .5 inches by .1 to .17 inches, yellowish white to pale yellowish brown, and the head and the thorax are slightly narrower than the abdominal region. The larval head is brown, length and breadth about equal, and antennae three-jointed. The dorsal surface of the prothorax is shaded with brown—more prominently in the newly-hatched larva. The legs are small, yellowish-brown, lightly bristled, with the tarsus in the form of a pad which bears a single claw. The abdomen is eight-segmented, the terminal segment bearing an anal shield dorsally, and ventrally a palp or "propleg" which is used in walking. The anal shield (see 8 in the illustration) is brown, with numerous circular white pittings that resemble a grating. The shield bears four large pairs of setae, the first and third pairs being clubbed, and the second and fourth aciculate. Dorso-anteriorly to the third pair of bristles there is a pair of small papillae; spiracles occur laterally on the second thoracic segment, and on each abdominal segment.

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Gold Seal

The deep Helical pattern of the Dunlop tread grips the road like one helical gear grips another — and *grips its full width.* Go in a hurry—and, from shoulder to shoulder, Dunlop bites into the road—transmitting the maximum engine power. Stop in a hurry—and the same wider road-grip makes your brakes more effective — holds you back from danger. Drive on wet or greasy surfaces — and Dunlop safely holds the road. Fit this great Australian tyre for safety, more mileage, silence and economy. To-day's prices are lower than ever before — and your local dealer stocks all sizes.



HELICAL TREAD PATTERN

The Dunlop tread pattern is based on the principle of helical gearing—one of the most efficient methods of transmitting power. By adapting it to a tread pattern Dunlop solved the problem of how to give tyres the maximum traction. This helical tread is one of Dunlop's most important improvements in tyre construction.

● The Dunlop tyre is a product of Dunlop–Perdriau Rubber Co. Ltd.—the largest manufacturing organisation in Australia, employing 5000 Australian workers, and making every variety of high-class rubber goods.



WAGGA GLADYS (7778).

The following are the Herd-testing Records of some of the Cows in Departmental Herds:—

Jersey Cow: WAGGA GLADYS (7778). This cow holds a world's record for butter production for the Jersey breed—22,847 lb. milk, 1,517 lb. commercial butter in 365 days. Awarded Champion Ribbon, Peter's Prize, R. A. Show, 1928. *Guernsey Cow:* WOLLONGBAR PARSON'S RED ROSE 20th (730). Holds a world's record for butter production for the Guernsey breed—17,252.5 lb. milk, 1,302.62 lb. commercial butter in 365 days. *Ayrshire Cow:* MISS DOT OF GLEN INNES (3760)—19,562.5 lb. milk, 1,088.64 lb. commercial butter in 365 days.

The Department has for sale young bulls from tested dams of the following breeds:—

MILKING SHORTHORN - JERSEY - GUERNSEY - AYRSHIRE

For further particulars apply to—The UNDER SECRETARY, Department of Agriculture, SYDNEY.

The Pupa.—The pupa (see 3 and 4 in the illustration) is .2 to .3 inches long, and about .14 inches broad. The large pronotum is deflexed anteriorly, and the head is bent back to lie beneath the first and second thoracic segment. Setae occur uniformly over the body, and the developing appendages (legs and antennae) are folded beneath the body as in other *Chrysomelidae.* The pupa is at first creamy white; the eyes soon darken, then the head, thorax, and abdomen, and finally the appendages.

The Adult.—The adult (see 6 in the illustration) is elongate in form, broader posteriorly than anteriorly; the female (.13 to .15 inches by .28 to .32 inches) is slightly larger than the male (.11 to .12 inches by .22 to .24 inches). The colour is bright orange with black markings. Each wing cover is marked with two prominent black patches, and in addition is slightly tipped with black. The terminal segment of the abdomen is black, the second last segment is black also, except for a small yellow band dorsally at each lateral margin. The eyes, the lower portion (tibia and tarsus) of each leg, and the ventral surface of each thoracic segment are black. The antennae are brown, except for the five basal segments in the male and the two basal segments in the female, which are yellow. Antennae, 11-segmented; simple in the female, but in the male (see 7 in the illustration) the third to fifth basal segments are wide and produced on each side. The abdomen bears five visible segments. In the female (see 9) the ventral surface of the terminal abdominal segment is plain, but in the male (see 5) it is deeply notched on either side, with a wide furrow extending longitudinally between the notches to the anterior margin of the segment.

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Unproductiveness in Ohanez Vines.

The Result of Forcing the Spring Growth.

H. L. MANUEL, Viticultural Expert, and N. D. LACKIE, Superintendent, Griffith Viticultural Nursery.

The decrease in the yields from Ohanez grape vines on the Murrumbidgee Irrigation Area during recent years has been investigated by the Viticultural Branch of the Department.

As the result it is now apparent that such practices as the application of water or nitrogenous fertilisers during October and November, with consequent stimulation of the vegetative growth of the vines during the spring months, have been responsible for the reduction in production.

The article which follows details the experiments carried out during 1932-33.

Growers of Ohanez vines throughout the Murrumbidgee Irrigation Area have been greatly perturbed, and at a loss to understand the continued decrease in yields which has occurred during recent years. In general, satisfactory crops were obtained until the vines were about eight years old, but from then onwards the yields have decreased each year. The vines do not now produce more than one-third the number of bunches they can reasonably be expected to carry through to maturity, and shedding during the blossoming period further reduces the ultimate yield.

For some time past the Viticultural Branch has been following certain lines of investigation, and it is now apparent that the forcing of the growth during the spring months by frequent or heavy irrigations, not only accentuates shedding during the blossoming period and is directly responsible for increased losses later in the season through berry wilt, but more important still, it adversely affects the differentiation of fruit buds for the following season. October and early November irrigations are disastrous to Ohanez, for it is during this period in the seasonal growth of the vines that the bunches which appear the following spring are formed within the dormant buds. Rain during October or November, the application of water or nitrogenous fertilisers, or any treatment tending unduly to stimulate the vegetative growth is reflected in an increased number of unfruitful buds the following year.

The Trials in 1932–33.

Experiments were again conducted in 1932-33, and for purposes of comparison an Ohanez plot was selected in one of the most vigorous vineyards (Farm No. 1848) on the Area, where spring irrigating has been practised, and another in a vineyard that has never been watered before December (Farm No. 218). A glance at the accompanying table should convince the most sceptical that "A vine produces fruit in inverse ratio to its strength, *i.e.*, a weak vine tends to produce more berries, and an excessively vigorous vine produces less fruit, than it can reasonably carry."

On Farm No. 1848 the soil is good, cultural operations have been thorough, fertilisers have been heavily applied, and it is recognised as one of the outstanding vineyards on the Area. On the other hand, the Ohanez block on Farm No. 218 was selected as a lightly-watered block, and the vines, on Riparia Gloire de Montpellier and Berlandieri X Riparia 333 phylloxera-resistant stocks, as representing a fair average of growth and crop; the soil is not above the average, cultural operations were good, fertilisers have never been applied and the vines were under-irrigated. It might here be mentioned that Riparia Gloire de Montpellier is a poor stock for Ohanez and Berlandieri X Riparia 333 reasonably good.

Table showing comparative production of (1) Spring-irrigated Vines; and (2) Vines not irrigated until December.

Farm No. 1848. (Spring-irrigated.)		Farm No. 218. (Not irrigated until December.)	
Irrigations.			
2 November	2·85 inches.	25 December	1·00 inches.
13 December	2·19 ,,	27 January	·75 ,,
9 January	3·76 ,,	13 February	·75 ,,
19 February	·77 ,,	12 March	1·00 ,,
27 March	·83 ,,		
11 April	1·44 ,,		
27 April	·73 ,,		
Total	12·56 ,,	Total	3·50 ,,
Average number of fruit rods per vine.			
10		5	
Total length of fruit rods per vine.			
33 feet.		12 ft. 6 in.	
Number of bunches per vine.			
49		56	
Weight of fruit per vine.			
35 lb.		43 lb.	
Number of bunches per 100 shoots.			
43		112	
Weight of fruit per acre.			
1st Grade. lb.	2nd Grade. lb. / Waste. lb.	1st Grade. lb.	2nd Grade. lb. / Waste. lb.
10,450	1,650 / 3,410	12,100	4,730 / 2,310
	Tons. cwt. qr. lb.		Tons. cwt. qr. lb.
Total ...	6 18 2 4	Total ...	8 10 3 16
Weight of prunings per acre.			
	Tons cwt. qr. lb.		Tons cwt. qr. lb.
	2 3 0 24		— 15 2 24

The large amount of waste in the crop on Farm No. 1848 was caused mainly by berry wilt. The discolouration which appears on one side of the berry during hot periods and is known as berry wilt or sun scald, is caused through the inability of the root system to supply sufficient moisture to the excessive top growth during such periods of extreme heat, with the result

that the berries suffer. This trouble can be almost entirely eliminated if water is not applied during the months of September, October and November, although substantial rains would have the same adverse effects as irrigations. However, rain of this nature is the exception rather than the rule.

The large quantity of second-grade fruit on Block 218 was small fruit as the result of insufficient irrigations, and most of the waste was also similar fruit, there being practically no scalded berries.

If normal winter rains are experienced and good cultivation is practised, the vines should carry through until the end of November without irrigation, but in the absence of satisfactory winter rain, the vines should be irrigated in July or August to promote a good bud burst, and a second irrigation should not be necessary before December. The point may be raised that the withholding of water until late November or early December will result in undersized fruit, but this is not so, for there is ample time for the berries to fill out to normal size.

Pruning to lateral rods increases the crop, but unduly small laterals tend to produce light bunches that ripen rather later than the fruit on the main canes. The fruiting rods for next season should be tipped when 8 or 9 inches long to produce strong lateral growth from near the base of the canes, but where suggestions with regard to the timing of irrigations have been adopted there will be no necessity to prune the laterals to produce a satisfactory crop.

Selected Citrus Buds.

The Co-operative Bud Selection Society, Ltd.

For some years it has been recognised that in most citrus groves there are trees that rarely produce sufficient fruits to be payable, whilst other trees are more constant producers of good quality and payable crops, so that with a view to enabling nurserymen to supply trees of the most productive and remunerative standards to planters, the above Society was formed under the ægis of the Department of Agriculture, and consists of representative fruitgrowers and nurserymen. The Society *does not and cannot make profits*, but merely exists to improve the fruit-growing industry by making available for budding selected buds from special trees of the best types of quality fruit and of reputed good bearing habit only. Trees from such buds should undoubtedly be more profitable and appeal to all progressive orchardists.

The Co-operative Bud Selection Society, Ltd., supplied the following selected buds to nurserymen during the 1932 budding season, trees from which should be available for planting during the 1933 planting season :—

Nurseryman.	Oranges.		Eureka. Lemon.	Marsh. Grapefruit.	Total.
	Washington Navel.	Valencia.			
L. P. Rosen and Son, Carlingford...	4,000	4,000	1,000	1,000	10,000
T. Adamson, Ermington	1,500	1,500	500	250	3,750
A. T. Eyles, Rydalmere	2,000	1,000	...	...	3,000
H. J. Ferguson, Wyong	...	200	...	...	200

—C. G. Savage, Director of Fruit Culture.

Fruit Flies.

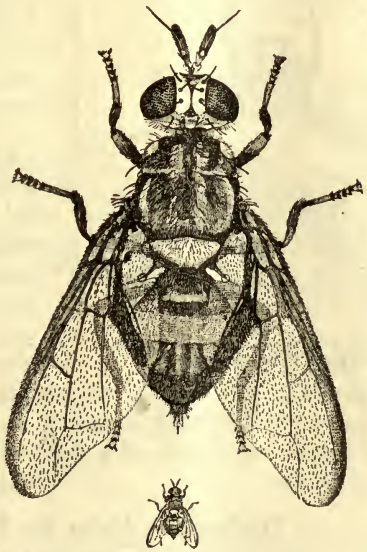
The Law Compels You to Control Them.

A determined effort is to be made this season to lesson the toll exacted by fruit-flies. To this end, the Department and the New South Wales Fruit-growers' Federation are combining in an effort to gain the wholehearted support of not only growers, but also urban dwellers who may have only a few trees, but which may be a breeding ground for as many fruit-flies as the most neglected commercial orchard. Coloured posters depicting the methods of control will be displayed on railway stations, in schools and elsewhere, while leaflets describing in detail the control measures will be distributed freely. Being also assured of the co-operation of the press, the campaign of enlightenment on fruit-fly control measures should prove much more effective than merely relying upon a rigid enforcement of the provisions of the Fruit Diseases Act, which imposes severe penalties for neglect to carry out the prescribed control measures.

Two species of fruit-fly, viz., the Mediterranean fruit-fly (*Ceratitis capitata*) and the Queensland fruit-fly (*Chaetodacus tryoni*), attack fruit in certain parts of New South Wales, chiefly the coastal districts. They infest citrus fruits to a very limited extent, but may become serious pests of late varieties of stone and pome fruits in the central and north coastal districts.



Fruit-fly Maggot.



The Queensland Fruit-fly.

The adult flies are two-winged and about the size of a house fly. The wings of the Mediterranean fruit-fly are mottled, while those of the Queensland fruit-fly are clear.

Life History.

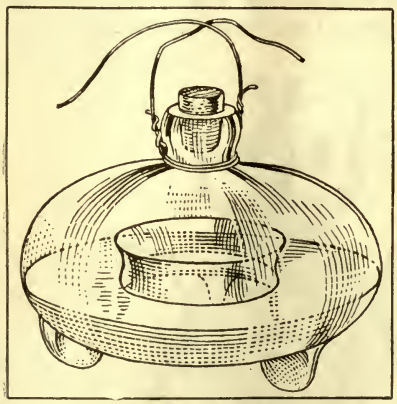
The eggs are minute, elongate and white, and hatch in a few days. The maggots are white to creamy-white in colour, have small black hook-like jaws, and feed for about two weeks (in summer) until fully grown, when they crawl from the infested fruit into the ground and pupate at a depth of 2 or 3 inches.

The adult fly, which emerges about fourteen days later, forces its way up through the soil to the surface. The adult insect then flies off and the female, after feeding, oviposits her eggs in or under the skin of the fruit. The time occupied in development from egg to adult in summer is about four or five weeks, but this period may be prolonged in cold weather.

Control Methods.

Destruction of Infested Fruit.—The control methods, set out in detail in the proclamation printed on the next page, comprise collection and destruction of all infected and waste fruit, combined with either spraying the trees with a foliage poison spray or trapping the flies.

Foliage Poison Spray.—While apple and pear syrup is recommended in the foliage poison spray, peach, plum or citrus syrup may be used, although the last-mentioned is less attractive to the Queensland fruit-fly. Apply the spray to two or more patches of the foliage rather than to the whole tree. A pump or syringe may be used, or the spray may even be splashed on with a large whitewash brush. Avoid spraying the fruit as far as possible.



Glass Fruit-fly Trap.

Trapping.—For trapping use an ordinary glass fly-trap, as illustrated. Bait the trap as prescribed and hang it in the tree about 6 feet from the ground, where it will be sheltered by the foliage. The greater the number of traps used, the better will be the results. Commence trapping on the earliest varieties and then in the sequence in which the varieties ripen. In making up the prescribed vanilla and ammonia bait note that a teaspoonful equals one-eighth of a fluid ounce and a tablespoonful one-half of a fluid ounce.

Proclamation Under the Plant Diseases Act.

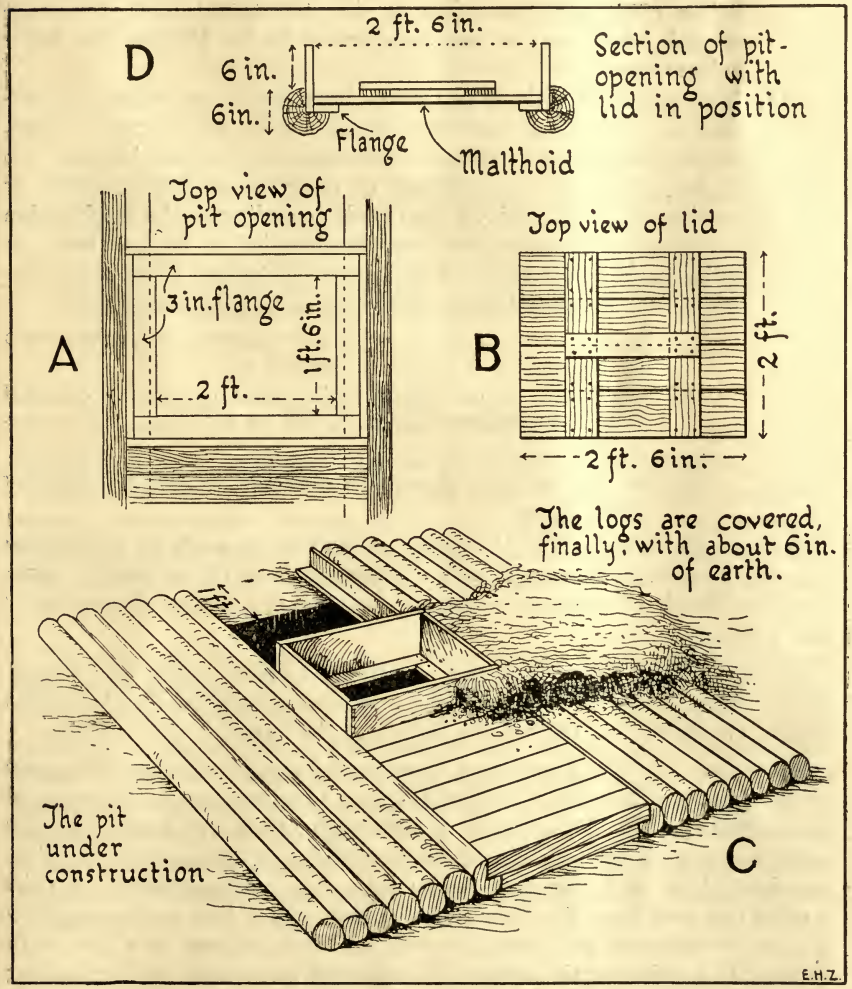
1. Every owner or occupier of land or premises throughout the State shall—

(*a*) at least once in every period of three days collect all fallen fruit;

(*b*) forthwith boil or burn all infected and all waste fruit or place such fruit in a pit covered in such a manner as to prevent the escape from the pit of any fruit-fly;

(*c*) not later than the first day of July in each year remove from the trees all seville oranges belonging to the intermediate crop, and not later than the thirtieth day of September in each year remove from the trees all mandarins and all seville oranges belonging to the main crop;

(*d*) not later than the thirtieth day of September in each year remove from the trees all loquats.



One Type of Insect-proof Cover for Waste Fruit Pit.

Provided that the Minister for Agriculture may exempt any owner or occupier from compliance with the provisions of this paragraph in respect of any crop or portion of a crop for such period and subject to such conditions as the Minister may specify.

2. Every owner and occupier of land or premises within the portions of the State described in the Schedule hereto shall—

(*a*) at least once in every period of seven days for a period of at least five weeks immediately preceding the harvesting or ripening, whichever is the earlier, of any pome, stone, loquat, guava or persimmon fruits apply to the foliage of each pome, stone, loquat, guava and persimmon tree at least ten fluid ounces of a foliage poison spray made according to the formula set forth hereunder or such other spray as may be approved by the Minister for Agriculture; or

(*b*) for a period of at least five weeks immediately preceding the harvesting or ripening, whichever is the earlier, of any pome, stone, loquat, guava or persimmon fruits attach to one tree in every ten or less number of each variety of pome, stone, loquat, guava or persimmon tree a fruit-fly trap made according to the specification hereunder described. Each trap shall be baited with at least six fluid ounces of freshly-made lure and shall be kept so baited during the period abovementioned. The lure to be used shall be—

(i) a fruit syrup made by boiling five pounds of apples, pears or peaches in 1 gallon of water; or

(ii) a mixture of one-eighth fluid ounce of vanilla, one-half ounce of household ammonia and 26 fluid ounces of water; or

(iii) such other lure as may be approved by the Minister for Agriculture.

Formula for Spray.—One (1) gallon of fruit syrup made by boiling five (5) pounds of fruit in one (1) gallon of water, three (3) gallons of water, four (4) pounds of molasses or treacle, and five (5) ounces of arsenate of lead powder.

Specification of Trap.—The trap shall be a spherical glass bowl aproximately seven inches in diameter and four and one-half inches in height, having an opening at the base to permit of the entry of the fruit-flies.

Schedule.—(1) The counties of Cumberland and Northumberland, parts of the counties of Camden, Cook and Hunter: Commencing on the east coast of the State of New South Wales at Gerringong Harbour; thence by a line north-westerly to the junction of the boundaries of the counties of Westmoreland, Cook and Camden; thence by a line north-easterly to a point 2 miles due west from the town of Emu; thence by a line north-westerly to a point 10 miles due west from the town of Bilpin; thence by a line north-easterly to a point on the western boundary of the county of Northumberland due west from Mount Yengo; thence by that boundary northerly to the northern boundary of the county of Northumberland; thence by that boundary easterly to the east coast of the State of New South Wales; thence by that coast southerly, to the point of commencement. (2) The municipalities of Grafton, South Grafton, Ulmarra and Maclean, and the shires of Copmanhurst, Nymboida, Orara and Harwood.

Citrus Red Scale.

Experiments with Liquefied Hydrocyanic Acid Gas Fumigation.

P. C. HELY, B.Sc.Agr., Assistant Entomologist.

Preliminary experiments were conducted at Leeton in March, 1933, and at Castlereagh, near Richmond, during April for the control of red scale (*Chrysomphalus aurantii* Mask.) by fumigation with liquefied hydrocyanic acid gas. This marks the first occasion on which liquid HCN was used in New South Wales. The material is now being manufactured in this State. It is a colourless liquid which quickly volatilises on exposure to the air, and in the experiments described hereunder it showed to advantage as compared with the standard calcium cyanide method of fumigation.

The Leeton Experiments.

These tests were performed on mature Valencia orange trees, heavily infested with red scale. The work was done at night with a practically constant temperature of 68 deg. Fahr. and a range of relative humidity of from 55 to 60 per cent., the surface soil beneath the trees being just moist. Ideal conditions, with no breeze, were encountered, and the sheets used were of good 10-ounce duck.

The apparatus for applying the liquid under the fumigation tent has not yet been standardised, and a different method was used in each experiment. At Leeton the liquid HCN was held in a metal can, and the dosage measured in centimetres in a graduated glass and blown under the fumigating tent at a pressure as a finely atomised mist. The liquid HCN dosage was calculated in cubic centimetres on an equivalent basis to the standard calcium cyanide dosage chart. Dosages 10 per cent. above and 10 per cent. below this rate were also tested, while a calcium cyanide compressed-block fumigant was employed on alternate trees for comparative purposes.

Results were estimated after an interval of two weeks by Mr. E. J. Wason, Assistant Entomologist, count being made of scales on fruits on many parts of the trees. The following table summarises the results and indicates a very satisfactory kill of scale in all tests. At a strength of 10 per cent. above and at the normal dosage the liquid HCN showed 100 per cent. mortality, whilst at 10 per cent. below standard the results were equivalent to those with the standard dosage of the calcium cyanide.

RESULTS of the Leeton Experiments.

Fumigant and Dosage.	Dosage.	Average percentage kill per tree.
Liquid HCN	Standard	100·00
Liquid HCN	Standard + 10 per cent. ...	100·00
Liquid HCN	Standard — 10 per cent. ...	99·81
Calcium cyanide	Standard chart	99·76
Average of controls (2)		0·0

The Castlereagh Experiments.

Valencia oranges were again used in these tests, but the trees were smaller than those used at Leeton. Heavy rain had recently fallen and the trees were showing new growth and the soil was very damp. The tests were similar to the Leeton ones, but with the addition of a plot treated at the rate of 20 per cent. below the standard calcium cyanide chart.

The method of using the liquid HCN was an improvement on the Leeton tests, greatly facilitating measurement of dosages. The apparatus consisted of a 3 lb. canister of liquid HCN connected by a pipe to a graduated glass cylinder capable of measuring up to 240 grammes of liquid. The canister was so arranged that a fresh one could easily be substituted. The glass cylinder was connected at the bottom to a discharge pipe fitted with an atomising nozzle, and at the top of the cylinder a small pump connection was fitted so as to allow a small brass pump to be attached. The whole apparatus was enclosed in a wooden box and was illuminated by a small electric bulb running on a battery and controlled by a small switch.

In measuring the dose necessary the liquid was allowed to run into the cylinder though a small cock until sufficient was shown on the gauge, when the cock was closed and a low pressure developed by a few strokes of the pump. The nozzle was then introduced beneath the tent, and the material atomised under pressure by releasing the control cock in the delivery tube.

Two types of cover over the trees were used in each plot,

All the work was done at night, the temperature range being from 62 deg. down to 51 deg. Fahr., and the corresponding humidity range from 41 to 79 per cent. relative humidity. In the first two "throws" particularly calm conditions were disturbed at occasional intervals by sharp gusts of wind of a few seconds' duration. The exposures in all instances were for forty minutes. No increase was made in the charge on account of temperatures, though the calcium cyanide chart recommends an increase of 25 per cent. for temperatures below 60 deg. Fahr. It is probable that owing to this the liquid HCN had an advantage over the calcium cyanide, as the liquid is more effective at the lower temperatures owing to reduction of diffusion rate and consequent reduction in leakage.

The actual estimating was done according to the method used at Leeton, counts of live and dead scales being made on as many fruits as possible on different parts of the trees. The natural mortality was calculated from

counts of live and dead scale on two control trees at the time of making the other estimations. From these two sets of figures the average net percentage kill was calculated and is summarised in the following table:—

RESULTS of the Castlereagh Experiments.

Fumigant.	Dosage.	Average net percentage kill.	Number of trees.
Calcium cyanide	Standard	99·56	8
Liquid HCN	Standard	99·85	8
,, ...	Standard + 10 per cent. ...	99·76	3
,, ...	Standard — 10 per cent. ...	99·75	4
,, ...	Standard — 20 per cent. ...	99·55	5
Average percentage mortality of controls.		1·385	2

The results show very little variation due to the different rates of dosage of liquid HCN, but the results from this material were slightly better than from the calcium cyanide at the standard rate.

Light-weight Tents Show to Advantage.

Two types of fumigating tents were used in each plot, one lot being of heavy calico and the other of closely-woven but lighter calico material.

An examination of the percentage kill on the trees under different covers shows a consistent, although very slight, advantage in favour of the lighter calico tents in all of the tests. This is particularly interesting when it is remembered that sudden sharp gusts of wind sprang up at intervals, and it suggests that the passage of a current of air through the heavier tents was possibly facilitated by the unduly rigid and tightly stretched tent walls. In the lighter tents the "caving in" on the windward side possibly tended to reduce this and to divert wind currents to some slight extent.

The following table illustrates the influence of the covers in different tests or "throws" during the experiment:—

TABLE showing Average Kill under Different Types of Cover.

Fumigant.	Light Calico.		Heavy Calico.		Details.
	Per cent. kill.	No. of trees.	Per cent. kill.	No. of trees.	
Calcium cyanide (standard)	100	3	99·65	2	Throw No. 1—Temperature, 62 deg. Fahr.; humidity, 41 per cent.
Liquid HCN (standard)	100	2	99·78	3	
Liquid HCN (standard + 10 per cent.)	...	...	99·76	...	Throw No. 2—Temperature, 59 deg. Fahr.; humidity, 48 per cent.
Liquid HCN (standard — 10 per cent.)	100	2	97·51	2	
Liquid HCN (standard)	99·76	3	...	...	
Liquid HCN (standard — 20 per cent.)	100	2	99·1	3	Throw No. 3—Temperature, 51 deg. Fahr.; humidity, 79 per cent.
Calcium Cyanide (standard)	100	1	98·6	2	
Percentage mortality in controls. Control A ...	2·3	1	...	...	
Percentage mortality in controls. Control B ...	0·47	1	...	...	

STANDARD Dosage Chart (in grammes per tree) for Liquid HCN. (As used in the Castlereagh Experiments.)

NOTE: For calculation of dosages as used in the Leeton experiments multiply the dosage indicated below by 1·5 and read the resultant figure as cubic centimetres. Increases and decreases were calculated as percentage of these chart dosages.

Distance around the tree (in feet).

Distance over the tree (in feet).

	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	
6	5	5	5	5	5	5	5	10																										6
8	5	5	5	5	5	10	10	10																										8
10		10	10	10	10	10	10	15																										10
12				10	10	10	15	15	20	20	25	25	25	30																				12
14				10	10	15	15	20	20	25	25	25	30	30	30	30																		14
16					15	15	20	20	25	25	30	30	30	35	35	35	40	40																16
18						20	20	25	25	30	30	35	35	35	35	40	40	45																18
20							20	25	30	30	35	35	35	35	40	40	45	45																20
22								35	35	35	40	40	40	40	45	45	50	50	50	50														22
24								35	35	40	40	40	40	45	45	50	50	50	60	60	60													24
26									40	40	40	40	45	45	50	50	60	60	60	70	70	80												26
28										40	40	45	45	50	50	60	60	70	70	80	80	90												28
30											45	45	50	50	60	60	70	70	80	80	90	90												30
32													60	60	70	70	80	80	90	90	100	100	110	110	120	120	130							32
34														70	80	80	90	90	100	100	110	110	120	120	130	130	140	140	150					34
36															80	90	90	100	100	110	110	120	120	130	130	140	140	150	150	160				36
38																90	100	110	110	120	120	130	130	130	140	140	150	150	160	160	170			38
40																	110	110	120	120	130	130	130	140	140	150	150	160	160	170	170	180		40
42																		120	130	130	140	140	140	150	150	160	160	170	170	180	180	190		42
44																			130	140	140	150	150	150	160	160	160	170	170	180	190	200		44
46																				140	150	150	160	160	170	170	170	170	180	190	190	200		46
48																					150	160	160	170	170	180	180	190	190	200	210	220		48
50	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	7	

Bees and Fruit Production.

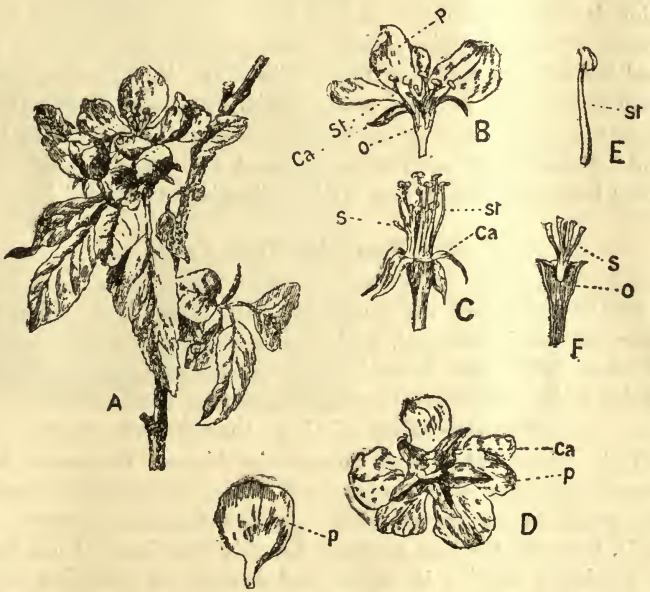
One Expert Recommends Three Colonies to Every Acre.*

Heavy losses are sustained annually by fruit-growers as a result of their trees not bearing well, which in many cases is due to defective pollination of the flowers of the trees. Investigations have shown that insects play an important role in the pollination of flowers, and in this regard there is none more industrious than the honey bee. If it were possible for human hands to do what the bee does, it is safe to predict that the owner of those hands would commercialise his ability and command a substantial wage. That the bee does it for nothing and is therefore neglected only goes to prove the old saying that what you get for nothing is often valued at cost price.

The Flower Structure.

An examination of the structure of a flower will at once reveal the meaning of the term pollination and the reason why insects are instrumental thereto:—

Many flowers consist, firstly, of the corolla with its coloured leaves, and under it the calyx with its small green leaves, and, secondly, of a number



The Parts of an Apple Flower.

A, Twig of apple; B, longitudinal section of flower; C, flower with corolla absent; D, view of flower from below; E, a single stamen; F, pistil with portion of calyx. (One-fourth natural size.) *Ca*, calyx; *p*, petal; *st*, stamens; *s*, style; *o*, ovary.

* E. M. Nyenhuis, Horticulturist for Northern Transvaal, in "Farming in South Africa."

of stamens arranged in a circle and terminating in knobs from which a fine powder (pollen) is given off, and of a thicker, centrally-placed, bottle-shaped excrescence or pistil, which is thicker at the base than at the tip. This distended part is the ovary containing the egg cells. The top end, called the stigma, is slightly distended or forked and viscous. Inside and at the bottom of the flower there are small glands which secrete the nectar, of which insects are inordinately fond.

Many flowers are complete in the sense that both the pollen and egg cells are produced by the one flower, *e.g.*, the peach blossom. Other flowers, again, are incomplete, *i.e.*, they produce either the pollen or the egg cells, but not both, *e.g.*, papaw flowers.

Some tree varieties, such as the walnut, produce both types of imperfect flower, while others, such as the papaw, produce them on separate trees.

Pollination Explained.

Nature has so planned it that two parts—the male and the female—have to unite before a new individual can be brought into being (for example, the seed in fruit). Our flowers demonstrate how necessary it is for the stigma to be covered by pollen to enable such merging to take place. This process is termed pollination.

The flower of a fruit tree is self-pollinated when the pollen of trees of the same variety is transmitted from one tree to another, while cross-pollination is the transmission of the pollen from one variety to another. The flowers of many fruit varieties are perfect, but have to be cross-pollinated before they can bear fruit. They are, therefore, self-sterile, as, for example, most almond and many apple, pear, and plum varieties.

Cross-pollination of most of our flowering plants is occasioned by insects and wind. Experiments with slides smeared with vaseline and exposed in an orchard have shown that very little pollen is transmitted by wind.

How Bees Play Their Part.

The reason why insects play such an important role in the pollination of flowers will be clear when the structure of the flower is considered. Inside the flower, nectar is secreted, and this attracts the insect, which, while crawling about within the flower in search of the nectar, accumulates pollen on its hairy body, and when it settles on another flower some of the pollen is bound to adhere to the sticky pistil of that flower.

Of all the insects that visit flowers the highest frequency belongs to bees, though there are other insects, such as the Syphrid flies, small beetles, etc., that assist in the transference of pollen from one flower to another. The bee is, however, the best equipped for this function. It has been shown that by placing a beehive in an orchard during the flowering season it is possible to enhance the fruit crop, even though the orchard may be in a fruit area famed for the production of good crops in normal seasons, and it has also been shown that the trees nearest to the hive bear the best crops.

The distance the pollen can be carried and the number of flights made by each bee will depend on weather conditions and the size of the swarm. On warm, sunny days the bees are more active than on cold or cloudy ones.

Three Colonies to Every Acre of Fruit Trees.

Experiments have shown that even with cold weather during the flowering season the trees nearest the hives bear better than those farther away. Thus, the greatest distance to which "suitable" pollen can be carried from its sources to the trees to be fertilised is determined by the unfavourable seasons. "Suitable" pollen is that which will produce good results after pollination. For example, the pollen of certain tree varieties will only be suitable for certain other varieties, *i.e.*, certain apple varieties for other apples, as is the case with pears, plums, strawberries, and almonds.



The Busy Bee at Work.

Therefore, in view of the above, it is recommended that bees be kept at the rate of one strong colony, or, where possible, two colonies to the morgen (about two-thirds of an acre). The hives should be moved about in the orchard during the flowering season, and removed thereafter.

Beekeeping should go hand in hand with fruit-growing to the furtherance of the prospects of greater profits.

"The Beginner in Bee Culture," by W. A. Goodacre, is a booklet on beekeeping that can be recommended both to the commercial apiarist and to the man with only a few hives. It is published by the Department, and is priced at 1s. 2d., posted. It has sold widely not only in New South Wales but also in the other States.

Orchard Notes.

NOVEMBER.

C. G. SAVAGE and H. BROADFOOT.

Picking and Packing Cherries.

DURING November the cherry-picking season will be in full swing. Many varieties of cherry are very delicate and very susceptible to injury, and the fruit must, therefore, be handled with care. The fruit should be harvested when at the firm, ripe stage, and when dry and cool. It should be picked with the stalk attached (since it then keeps better) and handled by the stalks. The bloom, on varieties which show any, should be retained, and varieties which bruise easily should be picked into shallow baskets holding about 10 lb.

It is found that kerosene tins cut in halves are suitable for cherry picking purposes. Some pickers prefer a side taken out, but in either case rough edges should be turned and well beaten down so that they will not injure the fruit when emptied from the tin. Whatever picking receptacle is used, it should be capable of being slung from the picker's shoulders or hooked to ladder or tree limb convenient to the picker, leaving both his hands free for picking. Many varieties of cherry trees have long, slender, flexible limbs which can be bent and held down readily under the picker's arm while he picks with both hands.



A Picking Stool.
This stool is also useful for pruning.

Use a Cherry-picking Stool.

Some form of scaffolding or of steps is necessary when picking cherries from large trees. To allow of quick shifting, steps should be as light as possible, and wide at the base to ensure stability. On a good cropping tree the fruit is crowded, so that the cherry picker is not changing his position as often as one picking larger fruits, and this being the case, a long platform stool is very convenient, for it allows the picker to work over quite a wide area of tree without shifting the stool. A stout plank of light timber

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Agricultural High Schools

THE Department of Education wishes to call attention to the facilities provided by the Hurlstone and Yanco Agricultural High Schools.

Provision is made in each for a three-year course leading to the Intermediate Certificate Examination. A Leaving Certificate course is now included at both schools.

In addition to a training in the agricultural sciences, the pupils receive a sound general education, and special attention is paid to practical training in the field and on the farm.

Owing to the increasing number of applicants for admission, it is now found necessary to determine priority of admission by competition at the High School entrance examination, conducted in conjunction with the Primary Final examination.

The boarders pay £11 11s. 0d. per term for board, lodging and laundry (three terms a year). If in attendance the whole three terms the total charge will be 32 guineas. In allotting places for boarders, preference is given to eligible applicants from country districts.

The equipment generally is up-to-date, and is designed to show the latest developments in labour-saving devices.

HURLSTONE.

The Hurlstone Agricultural High School is situated at Glenfield, 24 miles from Sydney, in modern buildings amidst spacious fields and playing areas.

The school accommodates 180 boarders and about 150 day boys. Day boys may obtain free train passes to and from their homes.

A Leaving Certificate and Matriculation Course is provided at this school for pupils who wish to enter the Teachers' College for training as teachers of agricultural subjects or to enter the University.

YANCO.

The grounds of the Yanco Agricultural High School comprise an area of approximately 1,000 acres, and the buildings are surrounded by capacious lawns and gardens. The school accommodates 200 boarders.

A Fourth Year course leading to the Leaving Certificate Examination will be instituted from the opening term of 1934.

A feature of the course is the instruction given in wool-classing and the application of irrigation to farming.

G. R. THOMAS,
Director of Education.

supported by two trestles is convenient when picking heavily-laden, very large trees where much of the fruit is out of reach of a picker standing on an ordinary stool. Pickers should be careful not to break off fruit spurs, as this means loss in succeeding crops.

Some Points in Packing.

The 12-lb. case is in most favour with growers and buyers of cherries. In packing, stemless cherries should be rejected, and the first (top) layer of fruit should be arranged in rows with stems hidden. Women and girls are usually the most expert packers. Lay the cherries, stems uppermost, on the bottom of the box, fill the box, taking care the corners are well filled, nail on the bottom, and then turn the box over and mark the face side as "top," or stencil the cases so that the properly-faced side will be opened, showing the cherries neatly arranged and presenting a very attractive appearance. When competent packers are not available or the fruit is rather small or soft for row facing, as described above, attractive facing can be secured by picking up the cherries by the stalk, and placing them in position in bunches, stalks uppermost, and then filling up as already described. No matter how the facing is done, care should be taken that it is fairly representative of the fruit that fills the box.

The boxes should be lined, top, bottom and sides, with clean white paper so placed that it can be folded back to expose the cherries when the box is opened.

Cherry Tree Slug.

If this pest appears the tree should be sprayed with lead arsenate before the slugs become too numerous. However, should the pest appear on the trees a few days before the fruit is ready to pick, as it often does, the spraying of course must be delayed until after the fruit is harvested.

The After-Care of Buds and Grafts.

Sometimes buds and grafts take excellently, but defects in the after-care of the trees lead to the failure of the growth from the buds and grafts to develop satisfactorily. This will be obviated if methods of after-care indicated in the following notes are followed.

Budded Stock should be Cut to a Stub.

In the spring, when the natural buds of the stock begin to develop, the shoots that were budded during the previous growing period should be cut back to start the inserted buds into activity. This cut should, as a rule, be made between 2 and 3 inches above the inserted bud. By doing this a stub is left, to which the inserted bud can be tied as it develops. This protects the new shoots from being broken off by the wind, by birds resting upon them or by being broken off by persons or by horses brushing against them.

In early spring, buds on the stub above the inserted bud should be picked off by the thumbnail, for such buds, if allowed to grow, will in many cases

sap the growth from the inserted bud or graft. It is, however, worth remembering that the inserted bud seems to develop more vigorously and more healthily if the buds on the stub above are allowed to start. Later it is necessary to pinch back the growth of the normal buds to prevent the inserted buds from being sapped. The latter benefit by sap circulation and sap elaboration encouraged by the former. Once the inserted buds are established and have grown out a few inches, the stub growths can be brushed off.

Treatment of the Growth from Below the Bud or Graft.

Many growths will develop from the stock below the inserted buds and from below the grafts inserted earlier in the spring of the current season. On nursery stock it is advisable that these should be rubbed off as soon as they appear, but it is better to allow some of these growths to remain on established trees. Care should be taken to prevent these growths sapping the vitality of buds or grafts. Such shoots as show great vigour are better rubbed off at once, otherwise they may prove a constant menace. It is, as a rule, better to allow weaker shoots to remain, but those that show increased and marked vigour should be pinched or slashed back in the interests of the inserted buds or grafts.

There are three advantages in leaving some growths below the bud or graft on the stumps of the worked-over trees:—

(*a*) The foliage of these growths changes raw food material into organised food material. It is important to remember that by cutting back main limbs in connection with budding or grafting, the major part of the foliage is lost, and the roots thereby suffer deprivation of organised food material until sufficient growth occurs to restore the balance between root and top.

(*b*) The growth of branchlet and foliage on the stump protects the bark from the sun, and by promoting sap circulation militates against sun scald of the bark.

(*c*) The extra growth helps to protect tender new shoots from inserted buds and grafts from breakages by wind.

Sometimes when working over established trees some limbs are left unworked. In such cases it is frequently necessary to check their growth during the following growing season or they will too greatly sap growth from the buds and grafts.

Treatment of the Shoots from Buds and Grafts.

These should be interfered with as little as possible during the growing season, but when they make rapid growth it is necessary to pinch them back to prevent them being blown out by winds. In winter prunings they should be cut back severely to prevent too rapid extension, until fairly established.

It may be necessary to remove superfluous inserted buds, but this should not be done until those selected for forming the trees are well established and offer a reasonable prospect of withstanding strong winds and other

adversities. Their gradual removal may extend over a period of two or three years; during this period they should be more severely pruned than the selected growths, for which they are a useful reserve in case of loss among the latter. Similarly selected scions on a grafted stump should be retained until the callous has spread well over and all round the cut edge of the stump. On a thick stump there should be more than one scion. If there is only one, the opposite side will be ill-supplied with sap or will be sapless and devitalised. Scions round the stump preserve sap circulation and hasten the callousing of the wound. Though delay in cutting scions out often necessitates a fairly big wound when the operation is performed, such wounds are surrounded by a new callous and the liberal flow of sap encourages rapid healing.

On re-worked established trees there is often rapid growth from buds and grafts, and during the first few years (until the callous has crept well round) there is danger of the shoots being broken out. For this reason new limbs should be braced. Many of the stubs left from cutting back budded stocks will dry and die, but sometimes they linger and grow feebly. In either case they should be removed. This can be carried out most conveni-enlty during the following pruning season, but delay until the following summer is better. For this work a sharp, fine, narrow-bladed pruning saw is often safer than secateurs.

Export of Apples and Pears to United Kingdom, 1933 Season.

The numbers of cases of apples and packages of pears and plums exported to the United Kingdom from New South Wales during the 1933 export season, together with the percentages forwarded to the various ports, were as follow:—

Apples.

Port of Unloading.	Cases.	Percentage of United Kingdom Total.
London	207,022	69·32
Liverpool	61,133	20·47
Glasgow	17,203	5·57
Hull	13,313	4·45
Total, United Kingdom	298,671	

Pears.

	Packages.	
London	26,660	66·02
Hull	13,723	33·98
Total, United Kingdom	40,389	

In addition, 7,430 boxes of plums were exported to the United Kingdom, all of which were consigned to London.

London received 69.58 per cent. of the total shipments of apples, pears and plums forwarded to the United Kingdom.

Conditions Influencing Size in Fruit.

Mr. W. W. Cooke, Senior Fruit Instructor, has supplied the following observations upon factors influencing size in fruit:—

As on former occasions when heavy crops of fruit occurred in most of the States in the same year, the prices received for fruit sold on the Sydney and other markets during the past season were often most unsatisfactory. Numerous cases have been recorded where the prices realised only paid marketing expenses, leaving the cost of growing, picking, packing, and cases to be borne by the orchardist. Some growers, however, state that, considering the glutted markets, the prices received for good lines of fruit have been satisfactory. These prices have varied considerably, and apples of the same variety and of similar quality excepting size, were sold during the same week for as low as 2s. per bushel, and as high as 9s.

Whilst an over-supply of fruit this season was largely responsible for the low prices received, other factors operated, among which may be mentioned the small size of much of the fruit, damage caused by black spot and hail, faults in grading and packing, and reduced purchasing power of the public. In many instances the fruit marketed was too small to sell for satisfactory prices during a year of abundant supplies. This want of size may be attributed to such causes as (*a*) trees carrying too heavy a crop of fruit, (*b*) dryness of the season, (*c*) damage to the leaves of the trees by disease and hail.

After a light crop of fruit, such as was harvested during the 1931-32 season, the tendency is for the trees to set a heavy crop the following season. Unless this is corrected by judicial pruning and also thinning out of fruit if necessary, small fruit will be produced. That the evils of a dry season can, to a large extent, be avoided by early ploughing and correct cultivation, was well illustrated this season in numerous orchards.

It has been proved that a certain number of healthy leaves to each fruit are necessary for the fruit to grow to a given size, and damage and destruction of the leaves by black spot or other causes must necessarily reduce the size of the fruit. Loss from black spot was more severe than usual last season in many districts. This may to some extent be attributed to less spraying than usual having been done the previous season, when crops failed through the attack by thrips.

Spray and Cultivate Thoroughly.

As in some orchards the crop of pome fruit will probably be light this season (1933-34), there is a danger that similar neglect may again occur, not only with spraying but with cultivation as well. If so, this is sure to act detrimentally, and both the trees and fruit will suffer the following season. As far as means will allow, it will be a sound policy to spray and cultivate orchards thoroughly, even though the setting of fruit may have been light, as this not only ensures good fruit this year, but will lay the foundations for clean fruit and healthy trees the year following. If necessary work is not neglected, and the trees are sprayed, cultivated, etc., even

though no fruit has set, the trees obtain the full benefit of the rest due to an off season, whereas if seasonal work is neglected, they are denied the advantages that should follow such rest. This was clearly illustrated during the 1931-32 season, when many orchards showed great improvement due to rest and attention.

Pineapple Varieties.

In last month's issue a reminder was given as to the best time and method of planting pineapples. The area sown to this fruit is increasing on the North Coast and new and prospective growers would be well advised to follow the cultural methods outlined in the leaflet issued free by the Department, whose address is Box 36A, G.P.O., Sydney.

Discussing the question of varieties the leaflet mentions that there are a good many varieties of pineapples, but, for commercial purposes, the most widely grown—being the best flavoured, the most hardy, and the best shippers—are Smooth-leaved Cayenne, Queen and Ripley Queen (or Ripley). In the north coast district, from Tweed Heads to Coff's Harbour, the Smooth-leaved Cayenne has proved the most satisfactory one to grow.



Pineapples just Planted Out under Double Row System.
Note how the plants in the double rows are "staggered," i.e., the plants in one row are opposite the spaces in the other row.

Queen.—This variety is free-growing, compact, and handsome, coming quickly to maturity. The fruit is of an attractive deep-yellow colour, very juicy, flesh pale yellow, of exquisite flavour, and a good keeper. The crown is of medium size and the flowers lilac. Weight, 3 to 6 lb.

Smooth-leaved Cayenne.—Leaves long and smooth or with very few spines, broad, dark green; flowers, purple; fruit very large, crown large, pyramidal, dark orange-yellow; flesh, pale yellow, rich, highly flavoured; pips, large, flat. Does not sucker so freely as other varieties. Usually weighs 6 to 10 lb. Largely grown for market.

Ripley Queen (*or Ripley*).—This variety is not as consistent a bearer as the common Queen, having one main crop and several "off crops." It ripens earlier than Queen and has a better flavour. Flowers purple, pips prominent. The fruit is roundish ovate, slightly compresesd at either end and of a pale copper colour when ripe; flesh yellow, firm, rich, and very sweet. The crown is of medium size and takes about twenty-two weeks from flowering to maturity. Weight, 3 to 6 lb.

A Banana Recipe Booklet.

When it is considered that the banana is an article of diet in every country of the world, and that the inhabitants of some portions of the globe subsist on it almost entirely, it is strange to find some people under the impression that bananas should be eaten sparingly and only by people with good digestion, runs the introduction to the banana recipe booklet issued by the Commonwealth Banana Committee.

It is true that the banana, eaten in an *unripe* state, will, in common with all fruits, cause intestinal disturbance to a greater or less degree. The *ripe banana,* however, is not only a fruit of remarkably high food value, but is amazingly easy to digest. It can be eaten with safety and relish by everyone from infancy onwards.

No fruit compares with the ripe banana in food values; no fruit approaches it in regard to digestibility and easy assimilation; no fruit and very few foodstuffs approach it in regard to value for money expended. Writing of the banana, Professor S. C. Prescott (Massachusetts Institute of Technology) says: "The ripe banana contains all the classes of food materials required for the human body. Although the amounts of protein and fat are slightly too low to constitute a perfectly balanced ration, the combination of bananas with milk, or its utilisation to supplement a diet containing a small amount of meat will produce a ration which is ample to take care of the body needs."

Copies of the booklet, "Banana Recipes," can be obtained free of charge from the Department, Box 36A, G.P.O., Sydney. It contains many more interesting facts concerning the food value of the banana and numerous well-tried recipes.

"An Orange a Day....."

According to reports of the autumn session of the Middlesex Hospitals Medical School the saying that an apple a day keeps the doctor away is due to be superseded by the saying—An orange a day keeps the doctor away.

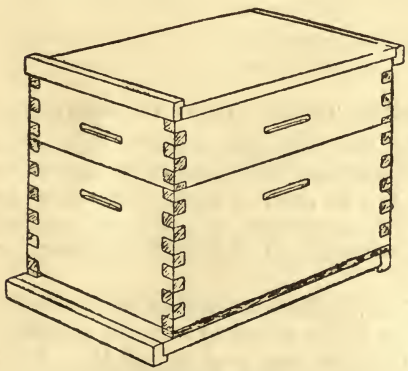
"The apple is a most delightful fruit," said Professor V. H. Mottram, Professor of Physiology of the University of London and an authority on foods, "yet it is only a sweetmeat and is negligible as nourishment or as a medicine. On the other hand, the orange is most valuable as nourishment, and medicinally. It is anti-scorbutic, and rich in the vitamin contained in sunlight. It also has calcium, which is essential to bone-building. Recent experiments indicate that oranges are nearly the equal of milk in nourishment."

Are Your Bees in Frame Hives?

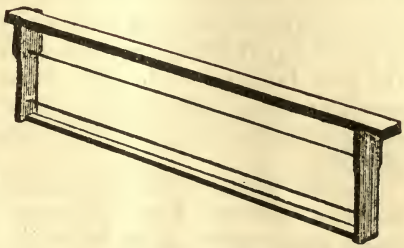
With the falling off in returns from their main sources of income, many farmers have turned their attention to sidelines, among which is numbered beekeeping. Judging from the number of inquiries that have reached us lately, it is patent that some of these newcomers into the industry have their bees in box hives, whereas the law provides a penalty of £20 for such an offence. The bees must be kept in frame hives. Below is described the method of transferring bees from box to frame hives.

Transfer the Bees during Warm Weather.

TRANSFERRING work should be carried out during warm weather and when a honey flow is on. First, prepare a standard-size hive body complete with frames, and standard-sized bottom board and cover. All the frames with the exception of one should be wired, and contain sheets (preferably full ones) of comb foundation. Give the bees in the box hive some smoke, remove the hive from its stand, and substitute for the time being the frame hive minus the one empty frame; this new hive on the old stand will keep the field bees occupied for a while. Next turn the box hive upside



A Langstroth Hive.



A Frame, Wired.

down, remove its bottom board, and place an empty box, open side down, over the combs; have a neat fit if possible. Drum the bees up into the empty box by beating on the sides of the box hive with two stout pieces of board. When completed remove the box now containing the bees and place it temporarily over the frames of the new hive on the old stand. The combs may now be removed from the box hive. The best pieces of worker brood comb should be cut to fit neatly in the empty frame, and made secure with string fastened right around the top and bottom bars.

Next lift up the box of bees from above the frame hive, and place the frame of brood about the centre of the frame hive; replace the cover on the frame hive, and then dump the bees from the box at the entrance of the new hive, and allow them to enter. It is usually best to dump a few first and see that eager entry is sought, and then bump the remainder out. The bees should make a contented start in their new home, having brood for inducement.

After the first box hive has been successfully transferred as mentioned and good headway made in brood rearing, other box hives may be transferred by what is known as the second method of transferring. Secure a frame of brood (preferably with some larvae), and place it in a new prepared hive fitted with comb foundation. Invert the box hive, place the frame hive minus its bottom board over the combs and then drum the bees up into the frame hive. When the drumming is completed, the new hive, now containing the bees, is placed on its bottom board on the old stand. Remove the cover of this new hive and place a queen excluder over the frames; then on top of the excluder fit the old hive to act as a super for the time being. In three weeks a good brood nest should be established in the frames, and all of the brood in the old box above will have emerged, the queen being unable to return to it. The box may now be removed and the bees drummed out of it into an empty box and then dumped in front of the new hive. The combs can be removed from the box hive and the honey and beeswax made use of. There is practically no loss with this method of transferring.

Summer School for Beekeepers to be held in January.

Arrangements are being made for the usual summer school in apiculture to be held at Hawkesbury Agricultural College, Richmond, from the 3rd to the 18th January, 1934. The course will be open to persons of either sex over the age of sixteen years, and the instruction will include practical work, lectures, and demonstrations, covering all the work necessary in apiaries.

The fee for the course will be £3 10s., including instruction as well as board and lodging. Students proceeding to the school by rail will be able to travel at concession rates where the distance each way to and from Richmond is not less than twenty-five miles. Students travelling by any of the North Coast Steam Navigation Co.'s steamers will also be entitled to a reduction in the fare.

The attendance at this course will be limited to twenty persons, and applications will be dealt with according to priority of receipt, subject to preference being given to those applicants who have not previously attended the summer school in apiculture.

Applications for admission to the course must be forwarded to the Under Secretary, Department of Agriculture, Box 36A, G.P.O., Sydney, by not later than 19th December next. A prospectus containing full particulars of the course will shortly be obtainable from the Department.

The Flax Industry.

Little Prospect of Success in Australia.

Because of the large importations of linseed for the production of oil, as well as the possibilities of an export trade in fibre, the Department has for many years been conducting experiments in an attempt to establish as an industry the growing of linseed. Seeds of a large number of varieties from all parts of the world where linseed is produced have been imported and tested, experiments being conducted at various experiment farms and in co-operation with many farmers under various conditions of soil and climate, but the results generally have been disappointing.

Are Our Climatic Conditions Unsuitable?

In an occasional favourable season satisfactory crops have been produced in New South Wales, and it is this exceptional success that tends to indicate that normally our conditions are unfavourable for the production of either linseed or flax. The probable reasons for the failure of linseed to thrive in this State are the irregularity of the rainfall and the short duration of the spring. The cereals wheat and oats are able to withstand dry spells which occur during their period of growth, but linseed appears to be checked by periods of scanty rainfall and by the high temperatures which are frequently experienced during the spring months.

Though the Department is continuing its experiments in an effort to discover means by which the crop can be produced profitably in this State, it does not at present encourage farmers to undertake the commercial cultivation of linseed.

That the experience in New South Wales has been similar to that in the other States of Australia is now evident from a report on the flax industry made available by the Development Branch of the Prime Minister's Department.

The following are extracts from this report, in which Australian experience has been assembled and comparison made between the cultural and processing methods and the economics of production in this country and those countries in which the industry has assumed larger proportions:—

Flax has been grown in small quantities in selected areas in Australia for upwards of thirty years, but it has been impossible during that period to establish a profitable export industry for the sale of fibre. The world's price of flax, expressed in gold currency, is at present close to the pre-war level, and little improvement, if any, can be expected, pending a solution of the present crisis. The development of a profitable export trade in fibre, therefore, would appear to be out of the question unless more economical methods can be devised for handling the crop and increasing the recovery of fibre per ton of retted straw treated.

Efforts that have been made in this direction are not encouraging. Revolutionary methods of treating the straw which would substantially decrease the cost of the fibre have been suggested, but, until manufacturers endorse the claim made in respect of the machines which have been invented by their willingness to utilise this particular fibre, it would be idle to pass any comment.

Linen goods are not manufactured in Australia, and the only local market available is that provided by the soft fibre requirements of the rope and cordage manufacturers, the limitations of which can best be appreciated from the fact that imports of Italian hemp have averaged only 383 tons for the last three years. On the basis of the results obtained in Gippsland during the past four years the production of 383 tons of flax fibre would necessitate the cultivation of approximately 4,000 acres of crop, but even this restricted area would probably exceed the present limit of economic expansion, for it must be remembered that Italian hemp, even if largely displaced by Australian flax, would still be a necessary requirement of the rope and cordage manufacturers. There does not appear to be any likelihood of a linen industry being undertaken in Australia, but, even if it were, there would be no guarantee that Australian flax fibre would measure up to the quality demanded by the trade.

Whilst flax fibre continues to command its present price in competition with Italian hemp there may be possibly some expansion of the present acreage. In the whole of the circumstances, however, with the prospective development of an Australian flax industry definitely restricted to the narrow dimensions already indicated, any aggressive policy of expansion should be avoided.

Experience has shown that climatic conditions render a great part of Australia's farming territory unsuitable for the production of linseed. Heaviest yields are obtained from certain districts in the south of Victoria and from Tasmania. Nowhere in Australia, however, is flax grown solely for seed.

All the evidence tends to show that on the average the general quality of Australian fibre can only be ranked as from medium to poor. Doubtless, good samples are obtained, but the general suitability of the fibre for textile purposes, apart from twines and cordage, cannot be determined except by large-scale commercial tests. Up to the present this proof is lacking. Unfortunately the investigation officers were handicapped by their inability to discover persons who had been trained in the various technological branches of flax fibre, and who might discuss the problems of the Australian industry from a sound practical knowledge of cultural requirements, processing methods, and textile suitability. If, as appearances indicate, the relatively poor quality of Australian fibre results from one or a combination of all the following factors, then the prospects of the ultimate success of the fibre industry are most discouraging:—

(1) Unsuitability of climatic conditions during the growing period.

(2) Growing a crop both for linseed and fibre.

(3) Cutting the crop with a reaper and binder instead of pulling it by hand or machine.

(4) Unsuitability of the climate, owing to its variability, for the dew retting of the straw.

It seems highly probable that the practice of dew retting may be a potent cause not only of the variability of quality of Australian fibre, which was so strongly emphasised by the twine and cordage manufacturers, but also of the low ratio of fibre to tow.

Reports from the Agricultural Departments of all the States except Tasmania (flax growing is against the declared policy of the Tasmanian Department) show that unsatisfactory results have attended the efforts to grow linseed, and until it can be demonstrated that the crop is profitable it would be useless to endeavour to interest farmers in its cultivation. Estimates of the cost of the production indicate that a yield of 12 bushels of linseed per acre at a price of £14 or £15 per ton would, at the present time, just about provide wages and pay expenses.

Tobacco Notes for November.

C. J. TREGENNA, Tobacco Expert.

A Complete Fertiliser is Essential.

To produce a bright "Virginian" type of tobacco suitable for cigarettes and for light pipe smoking it is necessary to use light sandy soils. These soils are lacking in fertility, and practical experience and experimentation in all tobacco-growing countries have proved that heavy applications of a complete fertiliser, that is, one containing nitrogen, phosphoric acid, and potash, are not only essential, but they pay well.

The actual quantities of each of the fertiliser elements to apply will, of course, vary according to conditions, but, based on present available knowledge, the following mixture is regarded as being suitable for general use in the production of light-coloured, mild and pleasant-flavoured tobacco:—

	lb.
Nitrate of soda	100
Dried blood	65
Superphosphate	307
Sulphate of potash	25
Muriate of potash	24
Dolomitic limestone	279
	800

It is advisable to apply the full amount of 800 lb. per acre. In America it has been found that quantities even up to 1,500 lb. per acre are profitable.

The fertiliser should not be broadcasted, but drilled in along the rows about 4 inches deep directly under the plants, preferably about a week prior to planting out. On small areas the fertiliser may, with advantage, be applied in two applications as side dressings, one application to be made in a saucer-sized ring and 3 inches deep around the plant as soon as it has struck, the second application to follow about three weeks later, the circumference of the ring to be increased this time to the size of a plate, and the fertiliser mixed with the soil to a depth of about 4 inches.

Transplanting.

WHEN the plants are from 6 to 8 inches in height and well hardened off, they are ready for setting out. The best plants are those which are most vigorous looking, and with short, broad leaves. Plants which are stunted and yellow, and which have long pointed leaves, should not be used. If the beds are dry and hard they should receive a good soaking some little time before the plants are drawn, so that as little damage as possible is done to the root system. The earth adhering to the plants should not be interfered with more than can be helped.

The best way to remove the plants is with a three-pronged fork. If the tap-root is long, it should be trimmed off with a pair of scissors to about 2 inches. The less handling the plants have the better, and after they have been drawn they should be placed, root downwards, in a cool place, and kept covered with wet bags. Only the plants that can be set out on the same day should be drawn at the one time.

It may here be stated that where the aim of the grower is to produce a fine-textured leaf, the plants should be set out close together, and although past experience must be taken as a guide, it will generally be found that a spacing of 24 to 36 inches in rows 3 feet 6 inches apart on light sandy loam will not induce heavy growth and coarse texture. This distance of 3 feet 6 inches between the rows will allow of horse cultivation, and thus lessen labour.

The ideal weather for planting out is just before and during rain, so that the roots of the plants may have very little check, and growth may be established as soon as possible. Unfortunately, however, weather conditions do not always suit the planter, and possibly owing to the lateness of the season he is forced to set out during dry weather. In this case holes should be made and filled with water, and the plants carefully put in and the earth well packed round the roots. Care should be taken that the roots are not doubled up, and that the hole is properly filled with earth. A simple test of planting is to pull the tips of the two top leaves gently in an upward direction, and if they break off in the fingers the plants are right. Another method where irrigation is not carried out is to make a hole close to the plant and fill with water, and then cover up to prevent evaporation. If the weather continues hot after transplanting, the plants should be shaded with grass. Paper folded in the shape of a tent and held down by two clods of earth is also very effective, and is recommended. It may be necessary to water, and, if so, it is best done early in the morning or about an hour before sundown. Plants which have struck well usually start growing in about ten days, and the covering may be removed.

If irrigation is carried out, a good plan is to turn two shallow furrows together with a light plough, and run the water so that the ridge gets a good soaking some little time before transplanting. The plants should then be set out on the shady side of the ridge, care being taken that the stem and leaves are high enough above the water to avoid being submerged. As soon as possible after transplanting it is advisable to run water through again to set the earth well around the bottom of the roots. After five or six days the crust around the young plants should be lightly stirred and broken.

Representations made by the Minister for Agriculture (Hon. Hugh Main, M.L.A.), have resulted in the Commissioner for Railways issuing directions that ground limestone is in future to be carried at manure rates and conditions, provided a declaration is made on the consignment note that it will be used solely for agricultural purposes.

A Furnace for Flue-Curing Tobacco Barns.

Plans and Details of Construction.

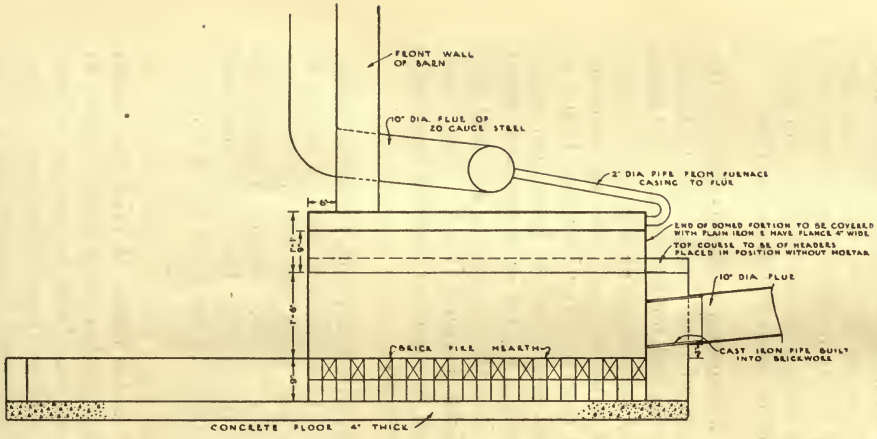
THE drawing of a furnace reproduced opposite shows most of the details required by the person charged with its construction.

As regards the material out of which it should be built, the casing to the furnace should be of bricks in Old English bond laid in cement mortar, the latter to comprise one part of cement to two parts of sand. The bricks before being laid should be well soaked with water, whilst the finished work requires protecting with bags or some such material for at least twenty-four hours in order to protect it from heavy frosts or the drying effects of a hot day. The top course of the furnace casing should be bricks on edge, but these are not laid until after the roof has been placed in position.

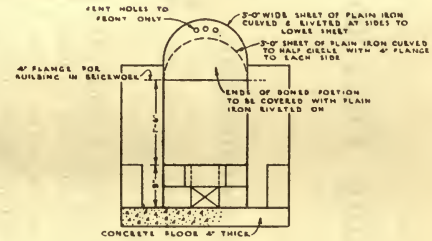
A double-domed roof with ventilated air space between is fitted to the furnace in order to guard against the risk of fire. Two sheets of heavy-gauge plain iron (3 feet by 6 feet) are required for the dome. The sheet forming the inner roof is bent to form a 4-inch flange on each side, so that it can be set on the second-top course of brickwork and the top course of headers then placed in position without mortar. The idea here is not so much to enable the roof to be replaced readily when burnt out as to prevent its being burnt out. When the bricks are set in mortar they sweat the portion of the iron roof that is let into the brickwork, and also tend to make the roof hotter, thus more quickly burning it out. The second sheet is not flanged, but merely riveted on to the other sheet at the angles formed by the flanges and the curved section.

The ends of the domed roof are closed in with plain iron, the front section having three vent holes cut in it as shown in the sketch, while a length of 2-inch pipe is let into the back section and leads into the outlet of the main flue pipe. This arrangement creates a "draw," causing a continuous stream of fresh, cool air to be sucked in through the front vent holes and to pass out the pipe at the back. This tends to keep the top of the roof comparatively cool.

The floor of the ashpit is of concrete 4 inches thick. A brick fire hearth is built into the furnace, details of its construction being plainly shown in the sketch. The bricks forming the hearth are placed in position without mortar, but after being well laid are grouted with good clean sand. When the first fire is lighted in the furnace the intense heat generated has the effect of fusing the outside surface of the bricks, thus cementing them together much more strongly than if mortar of any kind were used.

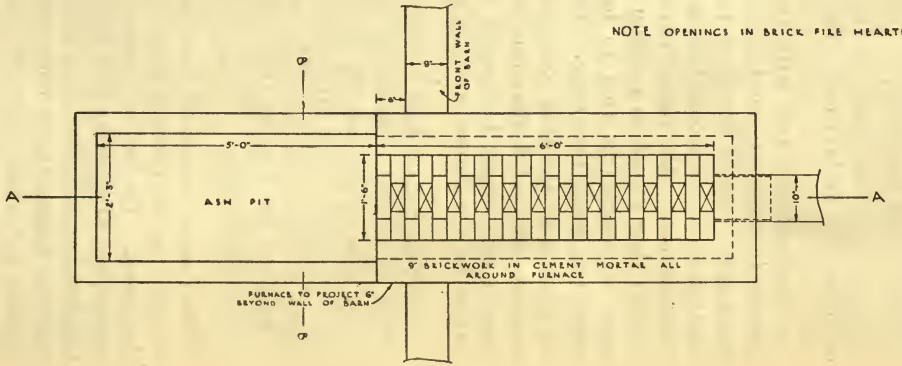


SECTION A.A

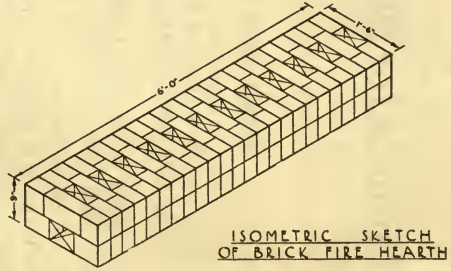


SECTION B.B

NOTE OPENINGS IN BRICK FIRE HEARTH SHOWN THUS ⊠



PLAN



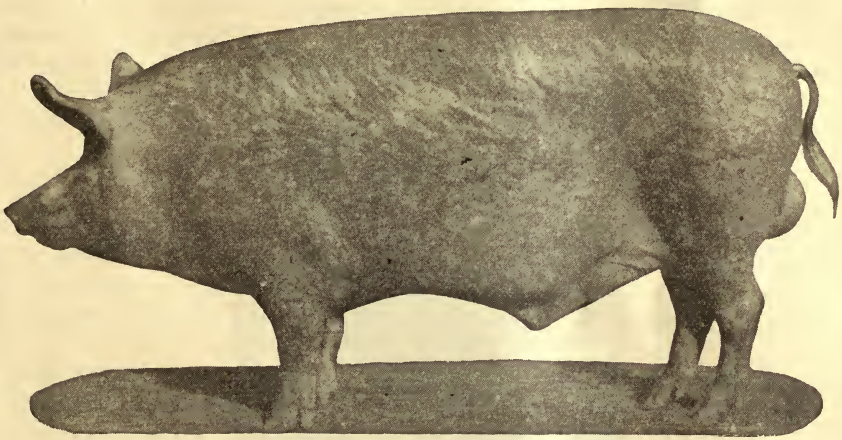
ISOMETRIC SKETCH OF BRICK FIRE HEARTH

Plans of Furnace for Flue-curing Tobacco Barn.

DEPARTMENT OF AGRICULTURE

NEW SOUTH WALES.

STUD PIGS for SALE



Tamworth Boar, " Whittingham Red Start " (Imp.).

Stud pigs of **BERKSHIRE and TAMWORTH** breeds are available for sale at—

Hawkesbury Agricultural College, Richmond.
Wollongbar Experiment Farm, Lismore.

BERKSHIRE pigs only are available for sale at—

Grafton Experiment Farm, Grafton.
Bathurst Experiment Farm, Bathurst.
Wagga Experiment Farm, Bomen.
New England Experiment Farm, Glen Innes.
Cowra Experiment Farm, Cowra.

Breeders are reminded that at the above institutions the studs have been augmented by importations of the best and latest strains available of Berkshire and Tamworth pigs from Great Britain.

Full particulars regarding prices, &c., can be obtained on application from the Principal, Hawkesbury Agricultural College, Richmond, or from the Managers of the farms mentioned.

G. D. ROSS, Under Secretary, Box 36A, G.P.O., SYDNEY.

DEPARTMENT OF AGRICULTURE.

STUD POULTRY



ORPINGTONS, LEGHORNS, LANGSHANS.

Available from the following Poultry Sections:—
HAWKESBURY AGRICULTURAL COLLEGE, RICHMOND;
THE GOVERNMENT POULTRY FARM, SEVEN HILLS;
WAGGA EXPERIMENT FARM, WAGGA;
GRAFTON EXPERIMENT FARM, GRAFTON.

BRONZE TURKEYS.

Available from Hawkesbury Agricultural College only.

Birds bred under expert direction and grown on free range.
The class required to improve farm flocks.
Price lists and particulars on application to the Principal or the Managers of the respective institutions.

G. D. ROSS, Under Secretary,
Department of Agriculture,
SYDNEY.

Poultry Notes.

NOVEMBER.

E. HADLINGTON, Poultry Expert.

A Crisis in the Poultry Industry.

ON present indications it is apparent that poultry farmers are faced with one of the biggest crises ever experienced in the industry, as the average price of eggs is already lower this year than last, and prices are likely to remain lower during the remainder of the flush season, while it does not appear that there will be any substantial reduction in the cost of the main feeding stuffs. It is essential, therefore, that those dependent upon the industry for a living should do everything possible to effect economies without causing any reduction in egg production.

How to Cheapen the Feed Bill.

Those new to the industry may be tempted to reduce the food supply as soon as production commences to decline, but such a course would soon bring about a worse state of affairs, as the birds must have as much food as they require, and any attempt to cut down the ration would prove disastrous. In cases, however, where costly rations are being fed a reduction in cost of feeding may be effected by gradually changing over to a simple balanced ration such as is fed to the Hawkesbury Agricultural College Egg-laying Competition birds and those on the Department's poultry farms. This ration is as follows:—

Morning Mash.		*Evening Feed.*	
Pollard	60 lb.	Wheat	66 lb.
Bran	34 lb.	Cracked maize	34 lb.
Meat meal	6 lb.		100 lb.
	100 lb.		
Salt	22 oz.		

With regard to the evening feed, the proportion of maize can be reduced owing to its higher cost than wheat, and where sufficient green feed is not available lucerne chaff meal or dust could take the place of up to 15 per cent. of the bran without affecting the "balance" of the ration.

Alternative Rations.

Should the price of wheat fall any lower wheat meal could probably be obtained or gristed on the farm at a cheaper rate than pollard or bran, in which case wheat meal could form up to 50 per cent. of the morning mash, as follows:—

Wheat meal	50 lb.
Pollard	20 lb.
Bran	23 lb.
Meat meal	7 lb.
	100 lb.
Salt	22 oz.

Another means of reducing the cost of the morning mash would be to use rice pollard in place of wheat meal, the other ingredients being the same as in the above mash. The difficulty, of course, is that the supply of rice pollard would not be adequate to meet a heavy demand, and for this reason it would be perhaps preferable to use partly rice pollard and partly wheat meal in conjunction with bran and pollard as follows:—

Rice pollard	24 lb.
Wheat meal	24 lb.
Wheaten pollard	24 lb.
Bran	21 lb.
Meat meal	7 lb.
	100 lb.
Salt	22 oz.

Where an abundance of green feed such as lucerne or other crops which can be finely chaffed is available, 20 to 25 per cent. by weight could be used in place of that quantity of bran, but additional green feed may also be given later in the day. Any change decided upon should be made gradually, otherwise production may suffer.

Prevent Wastage.

On some farms a good deal of wastage of food occurs through faulty feed hoppers in cases where dry feed is given, while in other instances the overfeeding of wet mash results in much wastage. These are directions in which a little care would result in a saving without affecting egg production.

One of the common faults with the dry feed hoppers is that they permit of the food being easily scratched out. A suitable type of hopper is illustrated in the Department's free leaflet on the feeding of poultry. Where wet mash is used it is important that it be mixed to a consistency that will be neither too flaky nor too wet. If too much bran is used the mash will not hold together and can easily be scratched about the pen by the birds, and when this occurs it soon becomes dried up and is not eaten.

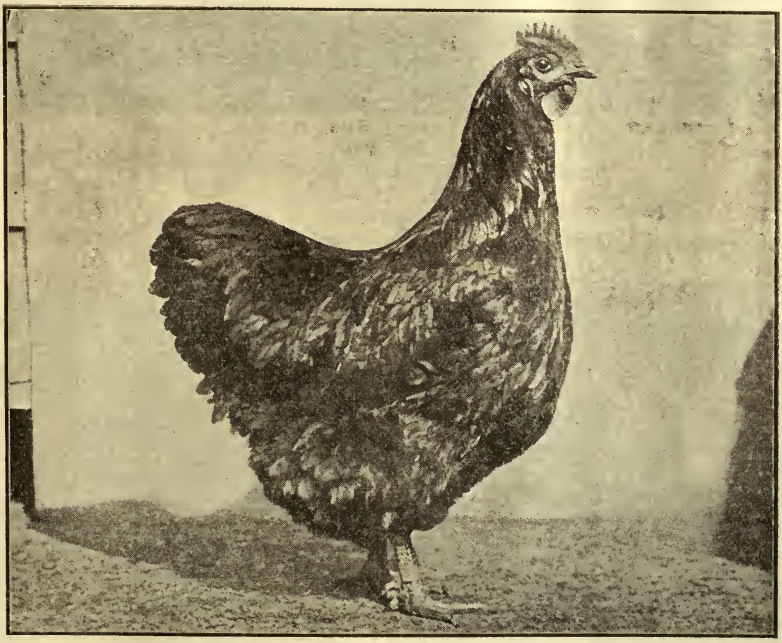
Another reason why on many farms the mash is fed in a very flaky condition is because the ingredients are mixed together before wetting them, instead of scalding the bran first and then mixing in the pollard. This latter method results in a far more satisfactory and appetising mash. For the adult birds the mash should be wet enough to adhere together under pressure with the hands, yet should not be sticky and should break apart when dropped into the feed troughs. The quantity to be given will vary according to the rate of production and the weather, but the birds should have as much as they will consume within an hour without leaving any of the food scattered about. It will usually be found that what is not eaten in that time will be scratched about the pens and much of it wasted. Apart from that aspect, if given too much feed the birds become surfeited with food and production suffers.

Cull Early This Year.

WHILE in normal times the matter of culling to any extent would not be considered until towards the end of December, the position is now such that no poultry farmer can afford to keep hens which are not capable of laying up to expectations for this time of the year. As a guide to the production that might reasonably be expected from a flock comprising half first-year and half second-year hens, the following table, based on a twelve-dozen eggs per hen per annum basis, may be helpful for checking up on the flock:—

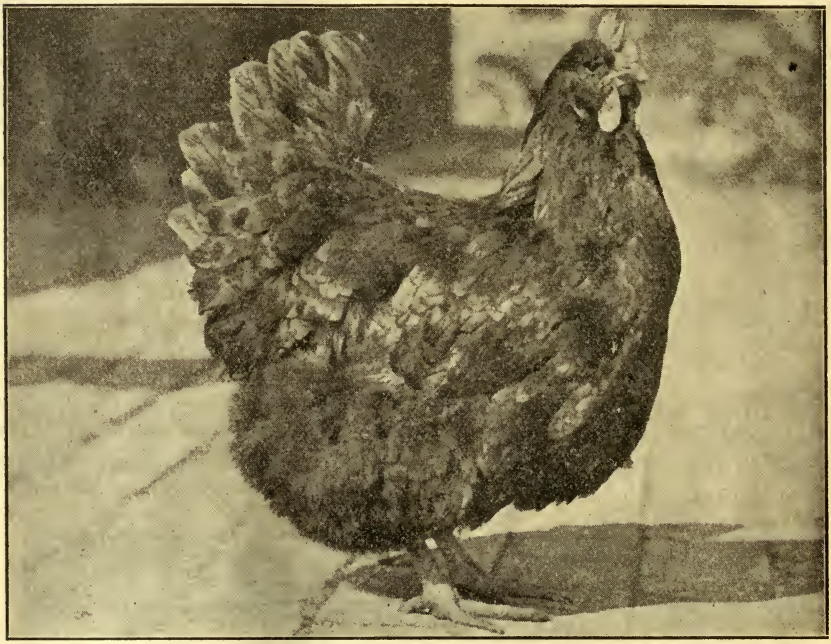
May	4 eggs per hen.	November	17 eggs per hen.
June	6 „ „	December	16 „ „
July	10 „ „	January	13 „ „
August	16 „ „	February	11 „ „
September	19 „ „	March	7 „ „
October	19 „ „	April	6 „ „

Anything in the nature of wholesale culling should not be undertaken (it should not be necessary on a well-managed farm), as this would only result in swamping the market and depressing prices. Moreover, in doing so, many hens which were only temporarily off laying would be sacrificed.



Good Layer.

The best course to follow before deciding upon the number of birds which should be culled is to make a count of the hens in the various pens, and keep a record of the laying for a period of at least a week, and if the rate of production is much below that shown for the particular month in



Poor Layer.



Head of Good Layer.



Head of Poor Layer.

the above table, a close investigation should be made to find out if it is due to faulty management or to conditions which may be responsible for a temporary lull in laying. What is required is a judicious elimination of the hens which are not likely to continue laying throughout the rest of the flush season. This will include mainly those which are not sound in health nor of good physique and also those which have become coarse, both among the first and second year birds. The accompanying illustrations give a good idea of the difference between the "worker" and the "drone." In the former will be noted an alertness in appearance, clean face, fine skull and prominent eye. The poor type shows the reverse, and although some birds of this class may be laying now they are not the sort that will continue, and nothing much will be lost by disposing of them, as they will bring more in the market now than after Christmas, unless, of course, low egg prices causes a rush to market of all and sundry hens, which action cannot be too strongly deprecated.

The best plan for those who are not experienced in culling is to pick out all doubtful birds and place them in a small pen for a week, and if in that time only a few eggs are laid it can be taken that the poor layers have been selected. If, on the other hand, a large number of eggs is laid, it will be a matter of going through them again to ascertain which are laying, and it is here that the condition of the pelvic bones will assist. The layers will be found to have wide-apart pelvic bones and the abdomen will be full and soft, whereas those of the non-layers will be contracted.

Our Birds Attract Attention at the World Poultry Congress.

According to a report received by the Minister for Agriculture (Hon. Hugh Main, M.L.A.), the five trios of fowls (Australorps, White Leghorns and Rhode Island Reds) which were despatched from Sydney in July last to represent the Department and several private breeders at the World Poultry Congress in Rome, arrived safely and in splended condition. The report further states that the birds have been very favourably commented on at the Congress. This must be very satisfactory to all concerned.

A New Cattle Tick Quarantine Line.

The Chief Veterinary Surgeon, Mr. Max Henry, has asked us to draw the attention of stockowners in the north to the fact that a quarantine line has been established from Sandy Hills across to the Queensland Border and that cattle moving southwards over this line must obtain the necessary permits and license under the Stock Diseases Act, and undergo two treatments before such move takes place. It would be well, therefore, for any stockowner in the area concerned who wishes to move cattle to get into communication with Inspector Smith at Woodenbong.

Dairying Notes.

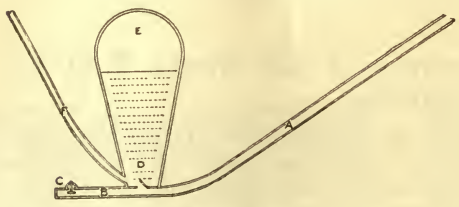
NOVEMBER.

Hydraulic Ram will Ensure Ample Water Supply.

AN ample supply of fresh water is often a problem on many dairy farms and, paradoxical though it may seem, this problem is often most acute in districts where the yearly rainfall is heaviest—the rainfall is seasonal and there is rarely any means of conserving supplies for the drier months. It is seldom, however, that running water cannot be found on a dairy farm in the coastal belt, although, admittedly, it is sometimes difficult of access. Furthermore, on the hilly dairying lands much energy is expended by cattle in travelling to and from the water supply. This results in lessened production. How much better to have drinking troughs quite handy and fed regularly with fresh water from these otherwise inaccessible sources by means of a hydraulic ram. The supply thus made available can also be made use of for the household and dairy.

The Ram Requires No Attention.

When properly installed and adjusted the hydraulic ram will work day and night if necessary without attention. The only essential is a fall or "head" of water. The accompanying sketches will serve to illustrate how it works and how to install it.



The Hydraulic Ram.

Water from the reservoir enters the inlet pipe, A. Attached to this pipe is a dome-shaped cylinder containing air, with a valve opening inwards at D. At the extreme end of the inlet pipe is another valve, opening inwards, at C. The discharge pipe is shown at F.

The valve at C is weighted so that it will open when the water in the inlet pipe at B is at rest. To adjust this, the vertical height of the water from the reservoir has to be taken into consideration. As the water enters it commences to flow out through the valve which is open at C. The force of this flow is sufficient to carry the valve up against its seat, and the momentum caused through this flowing column of water being suddenly checked is sufficient to open the valve D, through which a quantity enters until the pressure is relieved, when the valve C opens again, and valve D closes. Water again flows through the outlet valve C, when it is again closed and more water ascends through D. This action goes on repeatedly. The air in the dome-shaped cylinder is compressed, as shown at E, and this

compression forces the water through the outlet pipe, F. The valves work automatically, being regulated by the flow and pressure of the water, and will continue to work without attention as long as the water supply is maintained in the reservoir and the machine is in good order.

The quantity of water a ram will deliver varies under different conditions, but it may be taken as a general rule that one-seventh part of the water which enters the ram can be raised and discharged four times as high as the fall applied. Thus a fall of 10 feet would raise 1 gallon out of every 7 entering the ram 40 feet high, or half a gallon 80 feet high.

The inlet or drive pipe, A, leading from the supply in the reservoir (the surface of the water in which should be kept constant) should be from 50 to 200 feet in length, according to the work required. It should also be three-fourths as long as the height the water has to be raised. For example, to force water to a vertical height of 100 feet, the drive pipe should be 75 feet in length.

The delivery pipe, F, may be almost any length horizontally, but should not be more than five to ten times higher than the fall applied to the ram. When there is a fall of, say, 10 feet, the vertical height of delivery pipe should be from 50 to 100 feet higher than the ram.



The Hydraulic Ram. General Arrangement.

The fall should, therefore, be from five to ten times less than the height to which the water has to be raised. If, for example, it is necessary to raise the water 100 feet high, the fall or head applied to the ram should be from 10 to 20 feet. When heavy lifts are required, the length of the inlet pipe may be advantageously increased, or where this is not practicable the pipe may be bent in a coil of 6 or 7 feet diameter. The size of the delivery pipe should always be much smaller than the inlet or feed pipe. For instance, a ram having a 2-inch diameter inlet pipe would require an inch delivery pipe, a 4-inch pipe would require a 2-inch delivery, and so on.

The Profitableness of Fertilising Pastures.

THE fertiliser treatment which gives the most economical results on the pastures at Berry Experiment Farm is ½ ton lime every three years, 2 cwt. superphosphate every year, and also 2 cwt. sulphate of ammonia each year. With lime at £1 12s. per ton, superphosphate £5 per ton, and sulphate of ammonia £12 per ton, the cost of treatment works out at £2 per acre per year.

A comparison of the returns from the treated and untreated paddocks is interesting. An area in which the pastures were fertilised and properly managed produced at the rate of 219 lb. butter-fat per acre, which at 10d. per lb. works out at a return of £9 2s. 6d. per acre per year. An area which was not fertilised but on which the pastures were properly managed produced at the rate of 118 lb. butter-fat per acre at 10d. per lb., equalling a return of £4 18s. 4d. per acre per year, as compared with a return of only 25 lb. butter-fat at 10d. for £1 0s. 10d. per acre, from a paddock that was neither fertilised nor managed.

In addition to improving the return there is the satisfaction of knowing that the treated land is still better at the end of the season than the untreated land, and that the cattle are improved in every respect for having grazed on the more nutritious pasture.

Further evidence of the value of pasture improvement is indicated by the past season's production figures at Berry Farm. The total average production per cow for the year ended 30th June last was 8,910 lb. milk testing 4.22 per cent., or 376 lb. butter-fat. Compare these figures with those for the year ended 30th June, 1927, before pasture improvement work was undertaken seriously. In that year the production was 7,562 lb. milk of 3.6 per cent. test, equal to 272 lb. butter-fat per cow. It is of more than passing interest to know that last year's production figures include the milk of many heifers which are the progeny of the first animals reared on the treated pastures at Berry Farm, and they show a notable improvement in both appearance and production.—P. WALLER, Manager, Experiment Farm, Berry.

Hot Weather Demands Greater Vigilance.

Generally speaking, greater care in the handling of milk and cream becomes necessary during the summer months. Many dairymen are loth to realise that milk and cream are very delicate substances, that they readily absorb taints and odours and that their flavour and keeping qualities are easily spoilt. Scrupulous care must be taken, therefore, to prevent their pollution, not merely by dust, dirt and flies, and by the minute portions of the stale milk or curd which adhere to vessels unless they are regularly and thoroughly rinsed, scalded and scoured bright, but also by the smells and taints given off from dung heaps, dirty bails and yards, neglected skim-milk receptacles, and sour milk, rubbish and filth. These should not be allowed to accumulate or remain near places where cows are milked, nor where milk or cream is stored. Furthermore, workers must not be allowed to smoke whilst engaged in the milking shed or milk room, as the smoke taints the milk.

The foregoing is taken from *The Dairy Manual,* a copy of which should be in the hands of every dairy-farmer. It contains a copy of the Dairies Supervision Act and regulations and explains very clearly the dairyman's obligations in regard to the production and distribution of milk and cream. It also contains numerous plans of dairy-farm buildings.

Copies of the *Manual* are obtainable from the Department of Agriculture, Box 36a G.P.O., Sydney; price 1s. 1d. posted.

Miscellaneous Items and Hints.

Spread the Manure Droppings.

If the droppings are not harrowed regularly after each grazing, they produce patches of rank growth which are left by stock throughout the entire season, said Mr. P. Waller, manager of Berry Experiment Farm, addressing the recent Illawarra District Agricultural Bureau Conference at Camden. This condition increases with each successive grazing and results in the loss of a large proportion of valuable grazing area; it may even happen that much of this manure-covered land, if not harrowed, will not be available for years unless the droppings are ploughed in or removed in some way, continued Mr. Waller.

After careful observation it has been calculated that the year's manure from thirty cows contains fertility equal to that found in the following commercial fertilisers:—9 tons sulphate of ammonia, 2½ tons superphosphate, and 4½ tons sulphate of potash. At present prices these would be worth about £200 per year to the farmer and would represent a very real contribution towards his farm's upkeep. On the other hand, if the droppings are left unspread, the capacity of the pasture is limited in many respects. The wisdom of using the grass harrow to spread the droppings is therefore very apparent.

The Brahman (Zebu) Cross is a Hardy Type.

According to an extract, the Proceedings for 1933 of the American Society of Animal Production contains a paper dealing with the growth of different types of cattle in Louisiana, including crosses with the Brahman (Zebu). The writers state that the Brahman is pre-eminently a grazing animal and makes good gains on coarse grasses. The Brahmans do not appear to suffer to the same extent from flies, mosquitoes and external and internal parasites. They also stand the heat better. Further, at the Louisiana Station no Brahman grades have died from bloating on clover, while losses among the breeds of British origin are sometimes severe. The authors state that the principal advantage of the Brahman lies in its capacity for making gains on grass alone, a quality that is of great importance on the coastal plains.

Vaccines and Drugs Valueless for Contagious Abortion.

On numerous occasions stockowners have been advised against the use of vaccines of any type in connection with contagious abortion, writes Mr. Max Henry, Chief Veterinary Surgeon. This matter has recently engaged the attention of the International Bureau of Epizootics in Europe. The Bureau has issued a very comprehensive report on the matter, which fully bears out the attitude adopted by this Department. In the course of this report particulars are given of a recent experiment with four different types of vaccines available in Europe. None of these was found to be of any value. Details are also given of the attempted treatment of cattle with a long list of drugs of modern type, but again none was found capable of protecting cattle against contagious abortion.

Be on the Lookout for Heart Worm in Dogs.

Consequent upon the reported discovery of heart worm in dogs in the Moree district and its later discovery in a fox in the same district, the Department is anxious to determine how widespread is the parasite.

The fox from which it was taken was very weak and it is understood several landholders in the district have noted a similar weakness in foxes, but had assumed that they were affected with some form of distemper. It is clear that if this parasite is present to any extent in the fox, control will be extremely difficult, if not impossible, and in order to assist in determining this point it is asked that any stockowners who notice foxes affected with any disease should endeavour to shoot one and submit the heart and lungs for examination. The inspectors of stock in every district will be pleased to forward the specimens to Glenfield Veterinary Research Station.

It would be as well, also, if dogs in the country districts are noted to be affected or are suspected of being affected that the heart and lungs of any that die could be submitted for examination. Affected animals become disinclined to exert themselves, lose condition, become poor and weak, lose appetite, and suffer from nasal discharge. Cough may be present also.

Tubercle-free Herds.

THE following herds have been declared free of tuberculosis in accordance with the requirements of the scheme of certifying herds tubercle-free, and, unless otherwise declared, this certification remains in force until the date shown in respect of each herd:—

Owner and Address.	Number tested.	Expiry Date.
Lunacy Department, Parramatta Mental Hospital	12	1 Nov., 1933
Department of Education, Gosford Farm Homes	38	2 ,, 1933
E. E. McMullen, Springnook, Holbrook	31	3 ,, 1933
W. R. Boughton, Holbrook	33	3 ,, 1933
C. Maynard, Holbrook	12	3 ,, 1933
H. W. Burton Bradley, Sherwood Farm, Moorland (Jerseys)	67	16 ,, 1933
A. Shaw, " Ardshiel," Craven Creek, Barrington (Milking Shorthorns)	100	20 ,, 1933
Lunacy Department, Callan Park Mental Hospital	31	20 ,, 1933
Chapman Bros., Farm 166, Stoney Point, Leeton	43	25 ,, 1933
G. Powell and Sons, " Loch Lomond," Armidale	22	26 ,, 1933
Stace Bros., Taylor-street, Armidale	26	1 Dec., 1933
Department of Education, Brush Farm, Eastwood	8	3 ,, 1933
Lunacy Department, Morisset Mental Hospital	29	7 ,, 1933
W. W. Martin, " Narooma," Urana-road, Wagga	150	14 ,, 1933
J. F. Chaffey, Glen Innes (Ayrshires)	58	15 ,, 1933
E. E. Winder, Wybong-road, Musswellbrook	40	22 ,, 1933
C. J. Parbery, Allawah, Bega	142	8 Jan., 1934
Strickland Convalescent Hospital for Women, " Carrara," Rose Bay	8	9 ,, 1934
G. H. Hooper, Oak Hill, Bethungra	10	19 ,, 1934
H. A. Corderoy, Wyuna Park, Barrington, via Gloucester (Guernseys)	81	22 ,, 1934
A. L. Logue, Thornboro, Muswellbrook	45	25 ,, 1934
F. C. Harcombe, Hillcrest Farm, Warialda-road, Inverell	13	27 ,, 1934
J. B. Burtenshaw, " Sunnyside," Inverell	42	27 ,, 1934
Parker Bros., Hampton Court Dairy, Inverell	82	27 ,, 1934
New England Experiment Farm, Glen Innes (Ayrshires)	41	28 ,, 1934
Bathurst Experiment Farm (Jerseys)	31	1 Feb., 1934
W. K. Frizell, Rosenstein Dairy, Inverell	37	2 ,, 1934
W. Pigg, Redlands Dairy, Inverell	27	2 ,, 1934
A. N. de Fraine, Happy Valley Dairy, Inverell	28	3 ,, 1934
G. L. Genge, " Easton," Armidale	39	7 ,, 1934
J. Davies, Puen Buen, Scone (Jerseys)	244	9 ,, 1934
Forster & Sons, Abington, Armidale	189	12 ,, 1934
Newington State Hospital and Home	91	16 ,, 1934
A. B. Finney, Fox Ground, Gerringong	33	17 ,, 1934
Lidcombe State Hospital and Home	153	20 ,, 1934
Lunacy Department, Gladesville Mental Hospital	34	22 ,, 1934
Riverina Welfare Farm, Yanco	89	24 ,, 1934
Department of Education, Yanco Agricultural High School	39	24 ,, 1934
W. J. Miller, 199 Mann-street, Armidale	7	6 Mar., 1934
New England Girls' Grammar School, Armidale	41	8 ,, 1934
F. C. Butler, Yarranung, Bega	122	24 ,, 1934
G. W. Young, " Boorganna," via Wingham	39	30 ,, 1934
Hawkesbury Agricultural College, Richmond (Jerseys)	118	3 April, 1934
A. D. Frater, " Fairview Dairy," Inverell	61	5 ,, 1934
Cowra Experiment Farm	26	27 ,, 1934
St. Joseph's Girls Orphanage, Kenmore	10	4 May, 1934
G. A. Parish, Jerseyland, Berry	93	5 ,, 1934
Marion Hill Convent of Mercy, Goulburn	27	5 ,, 1934
St. Joseph's Convent, Reynold-street, Goulburn	4	5 ,, 1934
St. John's Boys' Orphanage, Goulburn	18	5 ,, 1934
W. M. McLean, Five Islands road, Unanderra	76	6 ,, 1934
Koyong School, Moss Vale	3	8 ,, 1934
Miss N. C. Brenan, Arankamp, Bowral	15	10 ,, 1934
Tudor House School, Moss Vale	21	13 ,, 1934
Limond Bros., Morisset	38	1 June, 1934
Navua Ltd., Grose Wold, via Richmond (Jerseys)	29	2 ,, 1934
Hurlstone Agricultural High School, Glenfield	44	22 ,, 1934
Berry Experiment Farm, Berry	145	13 July, 1934
Grafton Experiment Farm	271	14 ,, 1934
Australian Missionary College, Cooranbong	62	19 ,, 1934
William Thompson Masonic School, Baulkham Hills	37	20 ,, 1934
A. A. Campbell, Breadalbane, Mullumbimby	51	16 Aug., 1934
P. Ubrihien, Corridgeree, Bega	129	17 ,, 1934
E. W. Flower, Binna Burra	66	17 ,, 1934
E. C. Nicholson, Jillamatong, Corowa	137	20 Sept., 1934
St. Patrick's College, Goulburn	8	21 ,, 1934
C. Wilton, Muswellbrook	63	21 ,, 1934
S. L. Wills, Greendale Dairy, Cowra	28	27 ,, 1934
Wagga Experiment Farm (Jerseys)	65	25 Oct., 1934
Riverstone Meat Co., Riverstone Meat Works, Riverstone	92	9 Nov., 1934

Tubercle-free Herds—*continued.*

Owner and Address.	Number tested.	Expiry date.
Wolaroi College, Orange.	11	10 Nov., 1934
J. L. W. Barton, Wallerawang	16	17 ,, 1934
Wollongbar Experiment Farm, Lismore (Guernseys)	123	11 Jan., 1935
George Rose, Aylmerton	2	21 Feb., 1935
Mittagong Farm Homes	36	22 ,, 1935
R. C. Dixon, Elwatan, Castle Hill (Jerseys)	19	23 ,, 1935
T. H. Maples, Racecourse Farm, Bega	48	2 Mar., 1935
P. M. Burtenshaw, Killean, Inverell	63	28 ,, 1935
J. P. McQuillan, Bethungra Hotel, Bethungra	25	4 April, 1935
W. Newcomb, "Minnamurra," Inverell	85	6 ,, 1935
Lunacy Department, Kenmore Mental Hospital	84	4 May, 1935
St. Michael's Novitiate, Goulburn	4	4 ,, 1935
Rydalmere Mental Hospital	65	11 ,, 1935
H. F. White, Bald Blair, Guyra (Aberdeen Angus)	261	28 June, 1935
St. John's College, Woodlawn, Lismore	34	29 ,, 1935
W. S. Turnbull, Flanders Avenue, Muswellbrook	37	28 July, 1935
Sacred Heart Convent, Bowral	12	3 Aug., 1935
E. P. Perry, Nundorah, Parkville (Guernseys)	23	13 Sept., 1935
James McCormack, Tumut	81	28 ,, 1935

Municipalities Declared Tubercle-free.

The following municipalities have been declared tubercle-free areas and no cattle are allowed to be kept within the municipal boundaries unless subjected to the tuberculin test and found free from tuberculosis :—

Municipality of Queanbeyan.
Municipality of Muswellbrook.
Municipality of Inverell.

—Max Henry, Chief Veterinary Surgeon.

Abortion-free Herds.

The following herds have been declared free of contagious abortion (Bang's disease) in accordance with the requirements of the scheme of certifying herds abortion free.

Owner and Address.	Number in herd.
Martin Bros., "Narooma," Urana Road, Wagga Wagga	86
Cann, H. J., The Gap, Alstonville	...
White, F. J., and Sons, Bald Blair, Guyra	238
Mott, T., Main Arm, Mullumbimby	26
Henderson and Son, Upper Wantagong, Holbrook	95
Hawk, J. T., Ben Lomond	42
Sams, C. R., Wilson's Creek, Mullumbimby	34
Walker, Jas. R., "Strathdoon," Wolseley Park	32
East, N. A. L., East Valley, Gum Flat, via Inverell	51

—Max Henry, Chief Veterinary Surgeon.

Infectious Diseases Reported in September.

The following outbreaks of the more important infectious diseases were reported during the month of September, 1933 :—

Anthrax	Nil.
Blackleg	3
Piroplasmosis (tick fever)	Nil.
Pleuro-pneumonia contagiosa	5
Swine fever...	Nil.
Contagious pneumonia	1
Necrotic enteritis	1

—Max Henry, Chief Veterinary Surgeon.

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Write for further particulars, prospectus, and application forms to

The Principal,
Hawkesbury Agricultural College,
Richmond.

or

The Under Secretary,
Department of Agriculture,
Box 36A, G.P.O., Sydney

The Feeding of Dairy Cows.

[Continued from page 778.]

S. R. BALLARD, H.D.D., Senior Dairy Instructor.

In the previous instalment of this article the economy of growing and utilising farm crops was discussed and the importance of feeding a balanced ration stressed. The essential food constituents were also defined and discussed in regard to the part each one plays in meeting the requirements of the dairy cow. In this, the concluding section of the article, Mr. Ballard explains the practical application of those principles.

An Ideal Ration.

A well-balanced ration for a dairy cow is one wherein the factors mentioned in the previous instalment are taken into consideration and the proportion of protein to carbohydrates is about 1 to 5 or 1 to 6 (1 lb. digestible nitrogenous matter to 5 or 6 lb. carbohydrates). The amount of dry roughage required for a cow in milk may be stated to be approximately 2 lb. to every 100 lb. of live weight, or 1 lb. of roughage and 3 lb. of silage to the same live weight. A ration for maintenance purposes only does not need to be as rich in protein as in the case of a cow producing, say, 30 lb. of milk daily; a ration of 1 to 12 or 1 to 13 would be the most economical for simply maintaining the animal in good health. On the other hand, young growing animals require a much narrower ration than that of a cow in milk, in order to provide for flesh, muscle, bones, tissue, etc. The nutritive ratio in this case could be as low as 1 to 3. For maintenance purposes only, a dairy cow of 800 lb. to 1,000 lb. live weight requires approximately .7 lb. of digestible crude protein, 7 lb. of digestible carbohydrates and .1 lb. of fat. A cow would require approximately 50 lb. of silage or 50 lb. of paspalum daily to supply this amount of digestible nutrients.

It should be borne in mind that the fodder compositions given hereunder are not to be regarded as absolute: locality, climate, maturity and growth, and the fertility of the soil in which the crop has been grown will all affect the feeding value of a fodder. Nor, apart from this reason, must the results of the recommendations be expected to be invariable; those obtained from dairy stock under official record indicate that individual cows differ somewhat in their response to similar feed. **The rations here given supply the requirements of a dairy cow without consideration of pasture, and economies could therefore be effected on farms where good balanced pasture is available and a system of pasture management is practised. Any such economy, however, should be achieved by a reduction in the quantity of the ration rather than any alteration in the nutritive balance.**

Requirements According to Milk Production.

The amount of milk a cow is giving, together with the fat content of the milk, materially affects the nutrient requirements of the animal, and when a herd of dairy cows is in good condition it is upon due allowance for these two factors chiefly that the success of a ration depends. The following table shows the requirements of a cow according to the butter-fat content of the milk:—

NUTRIENT Requirements of a Cow According to Butter-fat Content of the Milk.

TABLE A.

	Dry Matter.	Digestible Crude Protein.	Digestible Carbohydrates (including fat.)
	lb.	lb.	lb.
For maintenance of 800 to 1,000 lb. live weight ...	15	0·7	7·1
And for each lb. of 3·5 per cent. milk add—	...	0·055	0·25
,, ,, 4·0 ,, ,, ...	...	0·060	0·27
,, ,, 4·5 ,, ,, ...	...	0·065	0·29
,, ,, 5·0 ,, ,, ...	...	0·068	0·32
,, ,, 6·0 ,, ,, ...	...	0·070	0·35

From the above table it is a simple matter to arrive at the total nutrients required by cows giving varing amounts of milk. This is done by multiplying the nutrient factors corresponding to the fat test by the amount of milk. Therefore, to fulfil the requirements of a cow giving, say, 25 lb. of 4 per cent. milk as per Table A, the following would suffice:—

TABLE B.

	Digestible Crude Protein.	Digestible Carbohydrates (including fat).
	lb.	lb.
Maintenance allowance ...	0·70	7·1
For 25 lb. of milk	1·50	6·75
	2·20	13·85

To arrive at the ratio of crude protein to carbohydrates, the amount of carbohydrates is simply divided by the amount of protein. The nutritive ratio of a ration is the ratio which the proteins bear to the carbohydrates-plus-two-and-a-quarter-times-the-fat.

Preparation of a Ration.

Given lucerne hay and corn silage as fodder, how would we prepare a balanced ration for a cow yielding 25 lb. of milk of 4 per cent. test?

To be correct the proportions of nutrients should compare approximately with those in Table B above. Utilising lucerne hay and corn silage as a

basis for its formulation, and taking, say, 10 lb. of lucerne hay and 30 lb. of corn silage, we find that the nutritive value of these is as follows:—

	Dry Matter.	Protein.	Carbohydrates.	Fat.
	lb.	lb.	lb.	lb.
10 lb. lucerne hay	9·14	1·06	3·9	·09
30 lb. corn silage	7·9	·33	4·5	·21
	17·04	1·39	8·4	·30

By utilising these two fodders in the proportions stated, however, there is a big deficiency in both proteins and carbohydrates as compared with the above standard, and it will be necessary to utilise some concentrates which we know are rich in digestible nutrients. Bran contains a high percentage ratio of protein and has a nutritive ratio of about 1:3 to 1:4. This would help to increase the protein content of the ration, but it will be necessary to include a class of grain to increase the carbohydrates. We will try 6 lb. of bran and 2 lb. of corn meal. The ration now stands—

	Dry Matter.	Protein.	Carbohydrates.	Fat.
	lb.	lb.	lb.	lb.
10 lb. lucerne hay	9·14	1·06	3·9	·09
30 lb. corn silage	7·9	·33	4·5	·21
6 lb. bran	5·39	·75	2·49	·18
2 lb. corn meal	1·79	·15	1·35	·09
	24·22	2·29	12·24	·57

This ration has a nutritive ratio of 1:5·9. The amount of dry matter is sufficient, the crude protein is practically the same as the standard example, and the combination of carbohydrates and fats compares with the standard very favourably.

Some Useful Balanced Rations.

	Crude Protein.	Carbo-hydrates.	Fat.	Dry Matter.	Nutritive Ratio.
	lb.	lb.	lb.	lb.	
(1) 10 lb. wheaten hay	·40	4·85	·08	9·19	
15 lb. lucerne hay	1·59	5·85	·135	13·71	
4 lb. bran	·5	1·66	·12	3·59	
	2·49	12·36	·335	26·49	1 : 5·3
(2) 20 lb. maize silage	·22	3·0	·14	5·26	
10 lb. lucerne hay	1·06	3·9	·09	9·14	
6 lb. ground corn	·45	4·05	·27	5·37	
4 lb. bran	·5	1·66	·12	3·59	
	2·23	12·61	·62	23·36	1 : 6·2

SOME Useful Balanced Rations—*continued.*

	Crude. Protein.	Carbo-hydrates.	Fat.	Dry Matter.	Nutritive Ratio.
(3) 20 lb. oaten hay	·9	7·62	·34	17·6	
5 lb. lucerne hay	·53	1·95	·04	4·57	
2 lb. corn meal	·15	1·35	·09	1·79	
2 lb. linseed meal	·63	·75	·05	1·80	
	2·21	11·67	·52	25·76	1 : 5·8
(4) 25 lb. green corn stalks	·25	3·20	·10	5·47	
10 lb. lucerne hay	1·06	3·9	·09	9·14	
4 lb. bran	·5	1·66	·12	3·59	
6 lb. ground corn	·45	4·05	·27	5·37	
	2·26	12·81	·58	23·57	1 : 6·2

AVERAGE COMPOSITION OF COMMON FOODSTUFFS
(Digestible Nutrients in 100 lb.*)

	Crude Protein.	Carbo-hydrated.	Fats.	Dry Matter.	Ratio.
Green Fodders—	lb.	lb.	lb.	lb.	
Maize	1·0	12·8	·4	21·9	1 : 13·7
Sweet sorghum	·7	14·1	·6	24·9	1 : 22·1
Barley	2·3	11·5	·4	23·2	1 : 5·4
Oats	2·3	11·8	·8	26·1	1 : 5·9
Rye	2·1	12·2	·5	21·3	1 : 6·3
Wheat	2·8	15·1	·6	27·4	1 : 5·9
Lucerne	3·3	10·4	·4	25·3	1 : 3·4
Cow pea	2·3	8·0	·3	16·3	1 : 3·8
Field pea	2·6	8·6	·3	18·8	1 . 3·6
Soy beans	3·2	10·2	·5	23·6	1 : 3·5
Saccaline	1·1	12·4	·4	20·0	1 : 12·1
Rye, 5 inches high ...	5·1	6·2	·7	18·1	1 : 1·5
Oats, 8 inches high ...	3·4	4·1	·5	13·0	1 : 1·5
Hay—					
Barley	4·6	48·2	·9	92·6	1 : 10·9
Oats	4·5	38·1	1·7	88·0	1 : 9·3
Rye...	2·9	41·1	1·1	91·9	1 : 15·0
Wheat	4·0	48·5	·8	91·9	1 : 12·6
Lucerne	10·6	39·0	·9	91·4	1 : 3·9
Silage—					
Maize	1·1	15·0	·7	26·3	1 : 15·1
Sorghum	·6	11·6	·5	22·8	1 : 21·2
Concentrates—					
Maize grain	7·5	67·8	4·6	89·5	1 : 10·4
Wheat grain	9·2	67·5	1·5	89·8	1 : 7·7
Oat grain	9·7	52·1	3·8	90·8	1 : 6·3
Barley grain	9·0	66·8	1·6	90·7	1 : 7·8
Cottonseed meal	31·6	25·6	7·8	92·1	1 : 1·4
Linseed meal	31·7	37·9	2·8	90·4	1 : 1·4
Bran	12·5	41·6	3·0	89·9	1 : 3·9

* Most of these analyses are from "Feeds and Feeding," by Henry and Morrison.

The Cheese Industry.

Are Dairymen Missing a Golden Opportunity?

A. B. SHELTON, Senior Dairy Instructor.

For the last twenty years the production of cheese in New South Wales has ranged between 2,500 and 3,000 lb. per year, whereas our local requirements, even on the present low basis of consumption (3½ to 4 lb. per head) range from 4,000 to 4,500 tons. Thus, it is necessary to import some 1,500 to 2,000 tons every year. Are there any good reasons why we should not manufacture locally this extra quantity? Read what Mr. Shelton has to say on the matter.

The South Coast, the Home of Cheese-making.

Although the cheese industry caters for little more than 3 per cent. of the total volume of milk produced in New South Wales, and the maximum amount of cheese produced per year has not increased to any extent during the last twenty years, it is nevertheless an industry of great importance to a section of our dairy producers.

The early history of cheese manufacture is largely a story of the development of dairying on the far south coast, where cheese-making was initially practised by the early pioneers as a means of providing a palatable and nutritious article of diet. As dairy production increased, naturally cheese became a tradeable product in those districts, and more distant markets were sought for surplus production. Cheese production in New South Wales in 1820 was estimated as under 50 tons, while in 1858 approximately 600 tons were produced. By 1890 production had increased to 2,100 tons, and yet in 1930 the total manufacture did not exceed 2,800 tons, and fluctuated between 2,800 and 3,000 tons in the following years; in fact, it may be said that the production of cheese in this State has remained steady at between 2,500 and 3,000 tons per annum for a period of at least twenty years, varying only in accordance with the effect of seasonal conditions on the volume of milk production.

The North Coast's Entry into the Industry.

Although these figures suggest that very little expansion of cheese manufacture has taken place in recent years, it is interesting to note that fifteen years ago only a small amount of cheese was produced in the northern areas, while to-day over 35 per cent. of the total production comes from districts north of Newcastle. What then has happened in the far south coast areas? Briefly, the more rapid development and better organisation of the butter industry on the lines of co-operative factories has gradually absorbed a considerable proportion of the supplies of milk originally retained on the farms for manufacture into cheese in farm factories. This change was

hastened by the introduction of home separation of cream for supply to central butter factories. Thus, whereas ten years ago some eighty registered cheese factories in New South Wales produced around about 6,000,000 lb. of cheese per annum, mainly on the south coast, last year, fifty-four registered factories, of which only thirty-three are situated south of Sydney, manufactured a similar amount of cheese. Of the fifty-four factories referred to, fifty-one are manufacturing cheddar cheese, two are making special or fancy varieties, and one is converting matured cheddar and Gruyere into the modern processed cheese moulded in tinfoil wraps, etc. Thus, the main output of New South Wales factories consists of cheddar cheese, which is easily the most popular variety in English-speaking countries.

Some idea of the relative size of these factories is indicated by the fact that twenty-five, or approximately 50 per cent. of those making cheddar, come within the registration classification of "farm dairy produce premises" under the Dairy Industry Act, each being equipped only to handle the milk produced from the owner's cows. The remainder of the factories are registered as "dairy produce factories," being mainly co-operative in nature and responsible for 75 per cent. of the cheese production in this State.

Local Demand Exceeds Production.

The consumption of cheese in the State ranges between 3½ and 4 lb. per capita, and thus our population requires annually between 4,000 and 4,500 tons for local use. This is far in excess of the amount produced annually, and after allowing for exports as ships' stores, trade with eastern countries and occasional shipments overseas to clear the market, it is necessary to import some 1,500 to 2,000 tons every year from other states to cope with consumption. A small proportion is, of course, regularly brought from overseas countries in the form of varieties not at present procurable locally, but it is noteworthy that at the present time two new factories are being equipped to cater for special trade of that type.

It would seem, nevertheless, that we have a ready market capable of absorbing approximately 2,000 tons additional production, and on comparing local cheese values with butter values it might be suggested that the dairymen of New South Wales are missing an opportunity by not taking steps to produce more cheese to meet local requirements. To those who may be considering such a proposal I would say that until our cheese producers take adequate steps to ensure that all New South Wales cheese can be guaranteed to be of choicest standard, interstate trade, controllable at present only by trade agreements of a voluntary nature, would force our producers into a greater volume of unprofitable export. This will be understood when it is noted that in the past season, 1932-33, the adjoining States of Queensland and Victoria produced and exported from the Commonwealth over 3,800 tons, representing surplus over and above state and interstate trade. It would seem obvious that New South Wales cheese manufacturers, before attempting to expand production, need to safeguard

their local market by taking every step possible to reach an objective of 100 per cent. choicest quality, with provision for sale of cheese on grade values.

In the past, cheese manufacture has returned to producers slightly better net values than butter manufacture, and during recent years an average advantage of approximately ½d. per gallon of milk used has been shown in cheese factory returns, after accounting for usual costs of manufacturing and selling. This, however, does not take into account the greater cost of carting milk to a central cheese factory seven days per week, as compared with delivering cream, representing one-tenth of the volume of the equivalent milk, only four days per week.

The Food Value of Cheese.

It has often been said—indeed, it has become quite a common saying—that cheese is indigestible, and should, therefore, be avoided by anyone subject to digestive troubles. To the contrary, when cheese of choicest quality is matured, it is in actual fact more digestible than many other foods we eat, and is often specifically recommended by medical authorities, not only for people in normal health, but for those suffering from dietetic troubles. Food analysts who delve into such matters as comparative food values, tell us that 1 lb. of cheddar cheese contains as much protein as 1½ lb. of sirloin beef and 1¾ lb. of white poultry flesh, and, on the basis of the energy it supplies to the human system, that 1 lb. of cheddar cheese is equal to 2 lb. of sirloin beef or 2½ lb. of white flesh from the breast of a fowl.

What a difference in energy value there must be then between a meat sandwich and the tasty cheese sandwich, and what an astounding difference it would make in the quantity of cheese consumed every year if only half of the people in this State ate daily the quantity of cheese it takes to make a full sandwich, say half an ounce. Assuming that half our people never touch cheese at present and could be induced to eat that ½ oz. per day, the increased consumption in New South Wales would more than absorb the whole of the cheese exported overseas from Australia each year. Similar results could, of course, be obtained if the per capita consumption for Australia was to increase a mere 2 lb. per head per annum, a quantity amounting to less than 3 oz. per month for each person.

The Miner Recognises the Energy Value of Cheese.

It is well known that a large proportion of our people are not averse to cheese, and, in fact, enjoy it as a supplement to their daily fare when available in a form pleasing to their palates. Apart from those who desire cheese in the form of special varieties having special qualities, the great majority of people demand only good cutting digestible cheddar, with either a rich mild flavour or else that commonly referred to as having a clean bite. It is well that these two types can be traced to almost separate avenues of trade. In mining districts, particularly our great coal areas, those accustomed to working underground recognise the part cheese can

play in maintaining bodily energy and daily use cheese for the mid-shift meal underground in preference to meat. Moreover, meat rapidly becomes unpalatable when kept in the luncheon bag under mining conditions. Similarly, the strong-flavoured cheese is not palatable under underground conditions, and so is built up an important trade for a mild cheese which will cut in slices.

Manufacturers supply this trade most successfully with cheese made from clean pasteurised milk. Prior to the successful introduction of pasteurisation into the cheese-making process, the practice was to cater for this trade with new cheese of high moisture content, in order that good cutting and slicing qualities, together with little or no flavour of a real cheesy nature, be maintained. High mosture content means more rapid maturation in cheese, and rapid maturation goes almost hand in hand with the development of undesirable flavours.

Pasteurised Milk Produces a Mild-flavoured Cheese.

Pasteurisation of cheese milk simplified the problem of manufacturing a cheese to suit the mining trade, so much so that among cheese men the keenest advocates of pasteurisation are those making cheese principally for the coal-fields' trade. In other words, pasteurisation combined with a system of adjusting the fat content in cheese milk to a normal proportion in relation to the solids not fat, has enabled uniform quality cheese containing only well-balanced moisture content to be made all the year round, resulting in cheese which will stand up to all requirements, including storage for winter sale when stocks may be short. With the exception that pasteurisation is almost essential to produce regularly a mild-flavoured cheese, the principles of manufacture are in no way different to those which it is recommended to follow when manufacturing cheese designed to develop a full, mellow flavour with a clean bite as soon as maturation has proceeded to a satisfactory degree.

As a result of carefully watching variations in methods of manufacture for a number of years and encouraging the adoption of an almost standard method of making cheddar cheese, whether from pasteurised or raw milk, the average texture of New South Wales cheese has been improved from the mealy acid type, prevalent a few years ago, to a smooth excellent-cutting type, with more lustre and even colour. The spirit of co-operation existing between the factory managers and the Department of Agriculture has been strong enough to achieve this result. I believe it is strong enough to force the necessary steps to eliminate, or at least reduce to a minimum, the present large percentage of factory output which develops undesirable flavours.

Hares and rabbits at times do considerable damage in orchards by eating the bark of the fruit trees. One of the best preventive methods is to wrap newspapers loosely around the trunks of the trees. They can be kept in position with string or wire.

Sheep Breeding.

Address by Mr. H. Kelly, of South Australia, at the Agricultural Bureau State Conference.

The principle that like begets like is the most generally accepted theory of breeding. There are exceptions to this rule, but generally speaking it is a sound basis on which to work. If one consistently culls from his dams, inferior animals, and chooses for sires those showing prominently the characters he requires, he must substantially improve his flock.

Choosing the Sire.

When choosing a sire, it is always wise to buy him as nearly as possible in a natural condition. Many young rams are so artificially forced that their development appears abnormal; but often this rate of development does not continue. The mistake is often made of buying, at shows, precocious youngsters whose development is the result of extreme forcing. If the beginner in sheep breeding can attain a critical eye for points of frame, constitution, and style of carriage, and distinguish between fat and flesh, he will soon know how to choose a sire to improve his flock.

Perfect animals are seldom bred and less seldom bought, and as a consequence, in addition to breeding only from the best, it is important to recognise the value of corrective mating. Practically all animals have distinct faults; many have good points equally distinct. The art of breeding lies largely in judicious mating to correct faults and perpetuate good points. Only experience and close study will develop that instinct that enables a breeder, by corrective mating, to build up the type he requires.

As a general principle it must be insisted that the individual animal be strong in essential points, and that, no matter how well an animal may have been bred, it does not pay to use a mean specimen. Yet we must look keenly into the pedigree; learn to examine a pedigree carefully, and see that there are no weak links, particularly in the first two generations. While the importance of length of pedigree can easily be over-estimated, it is vitally important to find out all one can about parents and grand parents of a sire. The extent of prepotency, or ability to transmit his good qualities, can be gauged largely by a look into his ancestry.

The Merits of In-breeding.

The question of in-breeding or breeding between close relations has always been a fruitful field for controversy. Many urge that there is no surer way to ruin a stud; yet it is an established fact that many of the greatest improvements to stock have been due to in-breeding. What is to be gained by in-breeding? By this means outside factors are excluded, and the qualities of the parents are more truly represented in the offspring. In-breeding tends to reduce the amount of variation due to the re-combination of

characters, and thus to fixity of type. Therefore, if a breeder obtains an animal of strong constitution and possessing most of the good points required, and shows no serious faults, he will be well advised to mate that animal to those of its relatives of like good qualities, particularly if strong in the points in which the sire inclines to weakness. It is certain that if a breeder definitely refuses to mate close relations under any circumstances, he will sacrifice the opportunity to produce and establish a better type of sheep.

There are two dangers of in-breeding; one is that if it is indulged in to any great extent the offspring is inclined to be lacking in vigour and also inclined to be sterile; the other danger is that if a ewe and a ram are closely related and have the same fault, the tendency is to emphasise this fault in their progeny.

These factors must be studied long before mating, and the breeder should know on which general line he intends to work before he goes near his yards. Each ewe, of course, must be examined individually and mated to that ram which will be most likely to transmit her good points as well as correct her faults. It will be found worth while to have the record books of the studs handy while classifying the sheep. It is very useful to know whether a certain ewe threw a good lamb to such and such a ram last year, or whether the offspring was culled.

The condition of the rams and ewes at mating time is worthy of consideration. The rams should be in healthy condition, but certainly not flabby fat, and should not be forced just before joining with the ewes. It is better to keep the rams in good condition all the year round than to keep them poor for most of the year and then have to force them for the last month. The same applies to the ewes; fat and thin ewes are less likely to take the ram, and if they do, they are hard to get in lamb.

The Advantages of Hand-serving.

If your ewes are running with the rams in the usual way, forty to a ram is as much as is usually safe. The ewes should be yarded often; our practice was to yard every other night. For the past two years, however, we have changed over to hand-serving, which has the following advantages over the other method:—

1. A ram can serve up to 200 ewes; by increasing the number of ewes a ram will serve you automatically increase the value of your ram.

2. You can use an old ram.

3. You can use a ram that you want for next year's show without letting him go back much.

4. You can be sure that every ewe on heat gets served.

5. You know if a ram is not getting his ewes by the number that come back.

6. You know for certain which of your ewes are in lamb.

Hand-serving is not as much understood as it should be. The rams and the teasers are kept in the yards and are well fed; the rams should have a dose of one tablespoonful of Epsom salts once or twice a week to keep them healthy. I use five teasers to 100 ewes, and do not think it makes any difference whether a teaser is a poor ram or not.

The ewes are brought in each morning before it gets too hot, and the teasers are left in with the ewes. Any ewes that are on heat are put in with the ram they are branded to, and after service, raddled, say down the left shoulder and put into the next paddock. This goes on for sixteen days, and then the two flocks are mixed and the process repeated. Any ewes that have not come back after being served in the first sixteen days may be taken as in lamb, and turned out into another paddock. Any that come back simply stop in the flock until they do not come back.

The only trouble we experience is that about 5 per cent. of ewes do not come on.

Points on the Care of Ewes and Lambs.

After mating the ewes should be kept on fair feed, but not allowed to get too fat, and should have access to as much medicated salt lick as they will eat. Our ewes lamb in the beginning of April, which is the middle of our autumn. They are always in from the back paddocks by 1st March, and are fed with silage if there is not enough green feed.

As the ewes lamb they are shifted through on to the next paddock, the lambs being "ringed" and the breeding entered as they go through. It is important that pedigrees be entered up in the stud book soon after ringing, because there is always the possibility that the shed book will get left in the rain, or mislaid.

The ewes with lambs must be hand-fed if there is no green feed. A ewe that has lost a lamb can always be made to take another, if she is shut up with it long enough. Tying the skin of the dead lamb over an older lamb is very helpful. If a lamb gets left in the cold soon after it is born, and it is too weak to stand, it can often be brought round if enough care is taken. It should always be fed on ewes' milk whenever possible. Do not try to give it too much at a time, as it is liable to choke. Keep it warm but not too hot. An orphan lamb should not be given new cow's milk; half milk and half water is suitable to start with, and later a change-over can be made to three-quarters skim and one-quarter new.

It is best to tail when the lamb is a fortnight old. We use pinches in tailing the pure-breds, but for the cross-breds we simply use a knife; the lambs are always in the yards the night before. The tails should be looked over two days later and any ugly scabs pulled off.

On a lot of properties foxes consume a lot of the profits. Each man has his own way; I simply poison birds and singe them. The baits should be laid early in the season.

As the lambs grow up do not lose interest in them. Get to know the mothers of good and poor lambs; you should always know the mothers of your stud rams. Also, notice any lambs that are having a hard time; many

a good stud ram has been sold out as a flock animal because he was a little backward at picking out time. Also, weigh your best lambs fairly often; it serves as a basis of comparison with other lambs and also tends to stress the value of early maturity, which is essential in British breeds.

When picking out your stud rams as distinct from the flock rams, go about it carefully. Pick out the obvious flock rams first, and then pick out the best from the remainder. Remember that a sheep not true to type will never be true, but a ram which shows no particular strength and no particular weakness will often grow into a good even sheep; so select your rams generously.

Drenching Sheep for Stomach Worms is most Effective.

Some misconception appears to have been created by reports on papers read at the recent meeting of the Australian Veterinary Association at Canberra in connection with parasitism in sheep, writes Mr. Max Henry, Chief Veterinary Surgeon. The impression appears to have been created that drenching is useless. It would be regrettable if such an idea were to obtain widespread belief. It is true that in the case of the small intestinal worms the effect of drenching is much below what one might desire and the question of the feed supply is of paramount importance, as indeed it is with all types of parasites. But against the stomach worm, which has been the cause of such serious economic loss to this State, drenching is most effective, particularly if carried out early and repeated as occasion demands. Where sheep are invaded with a mixture of parasites, as is usually the case, even though drenching may not be effective against all of them, yet to relieve the sheep of some types will in itself help them the better to resist those which are not affected by the drench. It will be seen, therefore, that a good deal depends on determining just what parasites are of particular importance in any given flock.

Agricultural Societies' Shows.

Secretaries are invited to forward for insertion in this list dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Box 36A, G.P.O., Sydney, not later than the 15th of the month previous to issue. Alterations of dates should be notified at once.

1933.

Mullumbimby (M. Flint) Nov. 15, 16

1934.

Dapto Jan. 9, 10
Albion Park... „ 16, 17
Kiama „ 24, 25, 26
Berry „ 30, 31
Wollongong Feb. 5, 6, 7
Nowra „ 12, 13, 14
Inverell (E. A. Clarke) „ 20, 21, 22
Newcastle (P. G. Legse) „ 21 to 24
Gunning (G. E. Ardill) „ 22, 23, 24
Yass (S. C. Sleeman) „ 27, 28
Moruya (H. P. Jeffrey) „ 27, 28
Maitland (Montie Brown)... ... Feb., 28, Mar. 1, 2, 3
Moss Vale (H. Richardson) ... Mar. 1, 2, 3
Queanbeyan „ 2, 3
Muswellbrook (R. C. Sawkins) ... „ 14, 15, 16
Goulburn „ 15, 16, 17
Gloucester „ 20, 21
Mudgee (T. P. Gallagher)... ... „ 20, 21, 22
Gunnedah (Reg. A. Brown) ... April 10, 11, 12
Kempsey „ 11, 12, 13
Dungog (W. H Green) „ 19, 20, 21
Gresford (A. R. Brown) „ 27, 28



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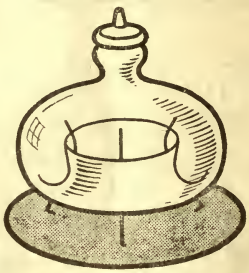
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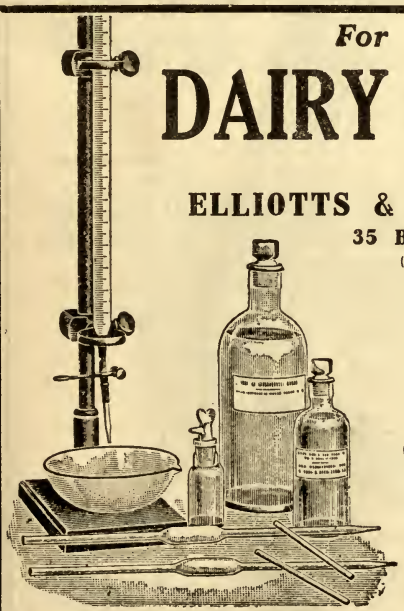
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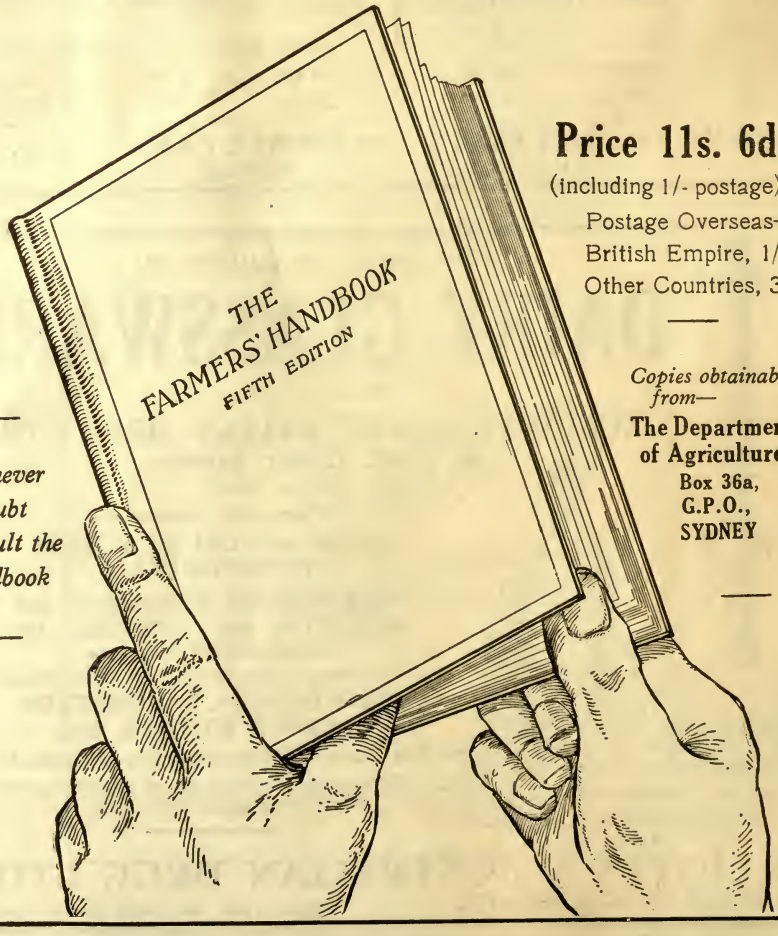
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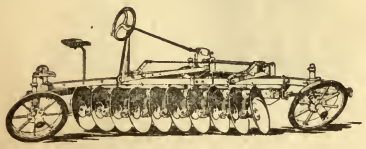
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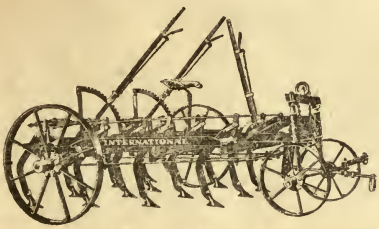
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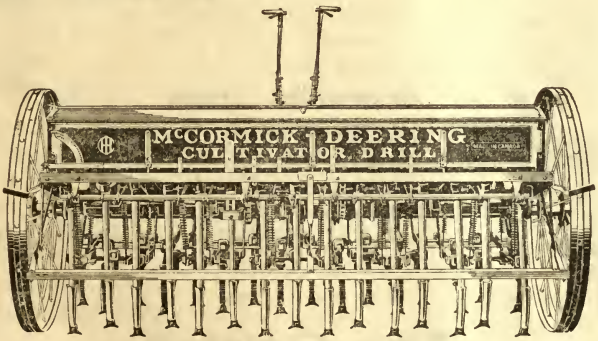
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VOL. XLV. PART 9. SEPTEMBER

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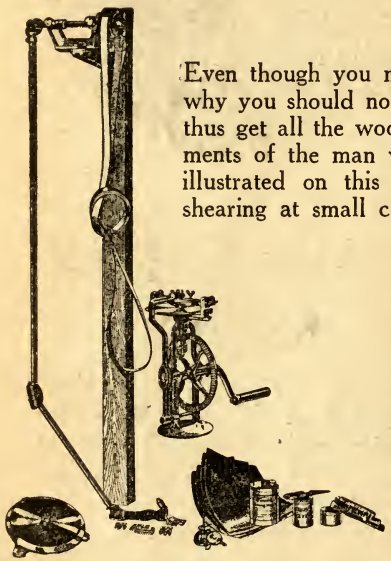
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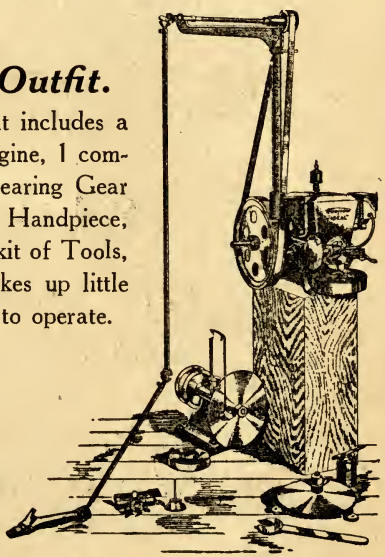
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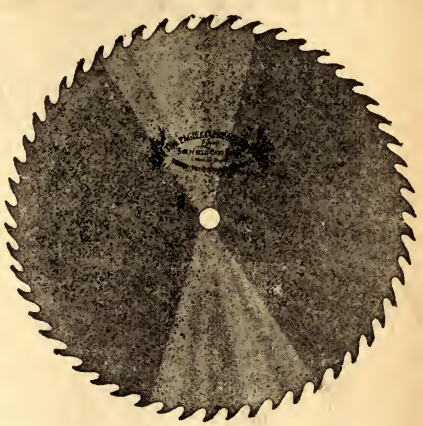
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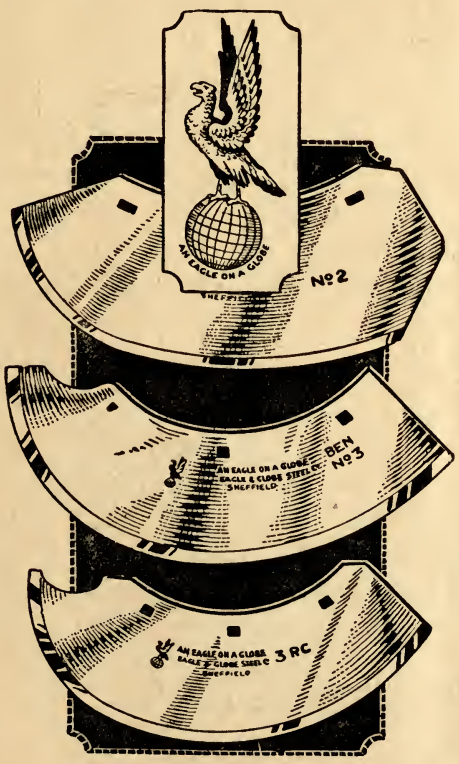
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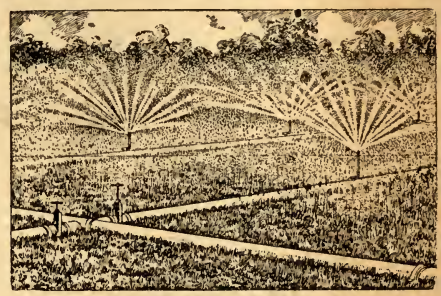
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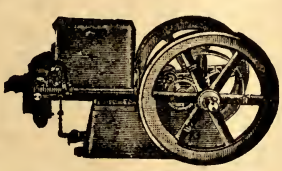
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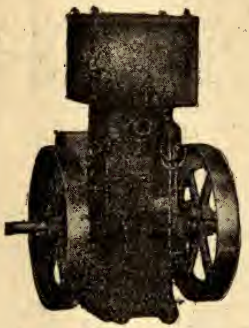
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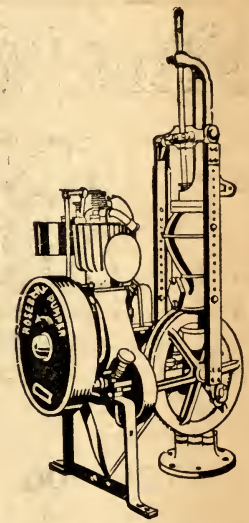


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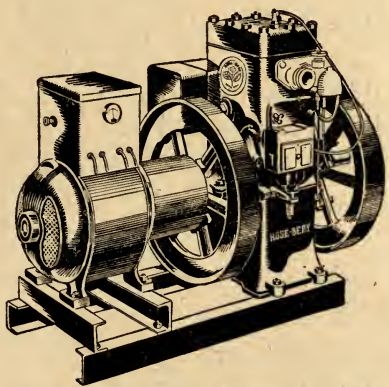
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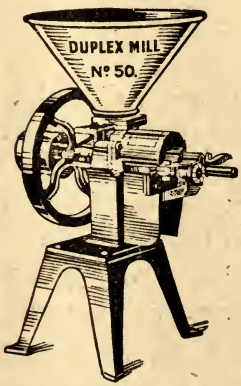
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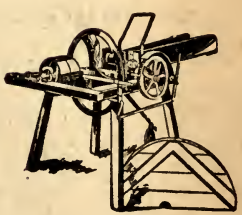
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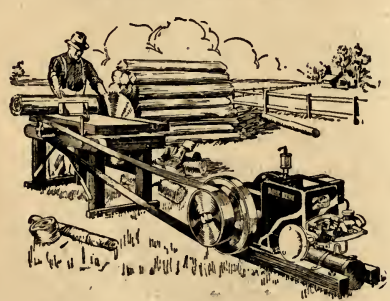


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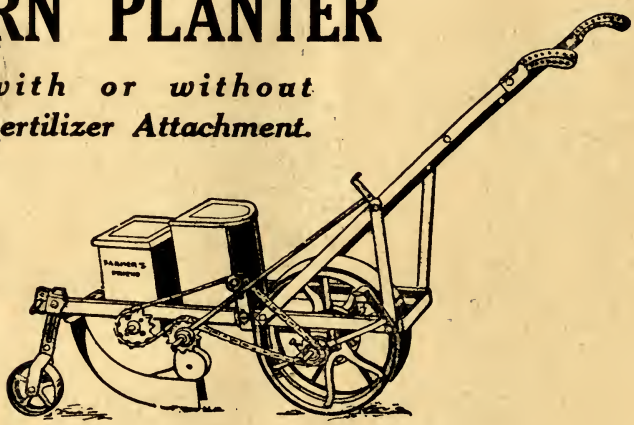
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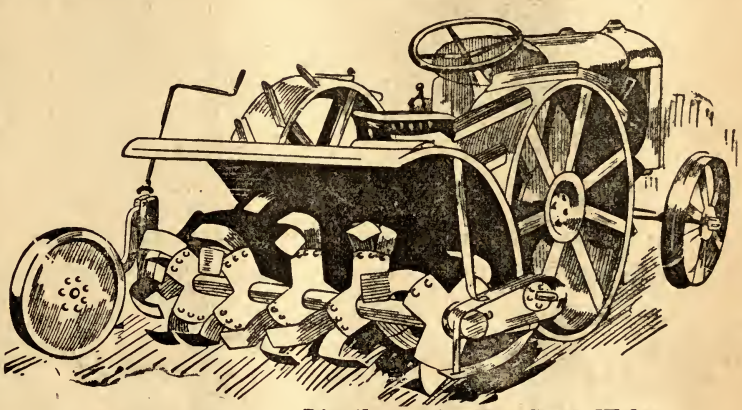
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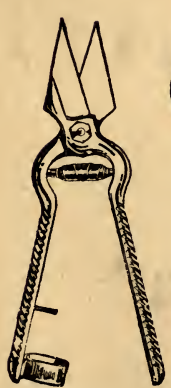
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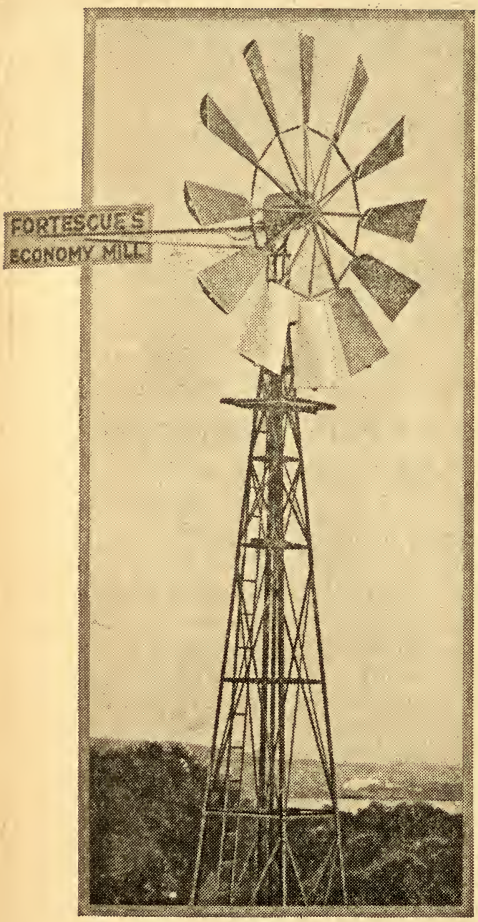
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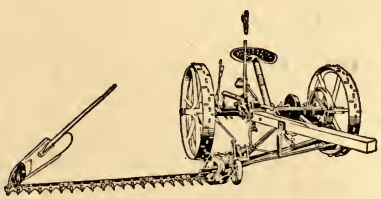
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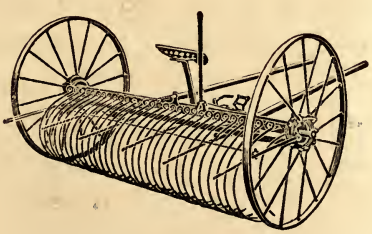
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The Hon. HUGH MAIN, M.L.A.,

MINISTER FOR AGRICULTURE.

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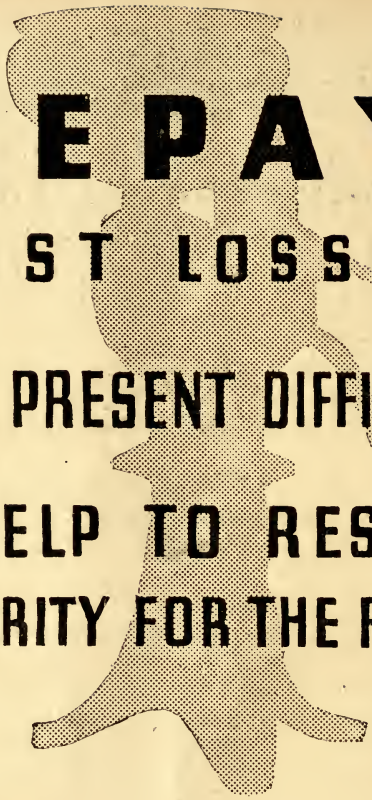
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THE AGRICULTURAL GAZETTE OF NEW SOUTH WALES

Vol. XLV. Part 9. September 1, 1934.

Dairy Farmers Put Their Faith in Silage.

Coastal Fodder Conservation Championships, 1934.

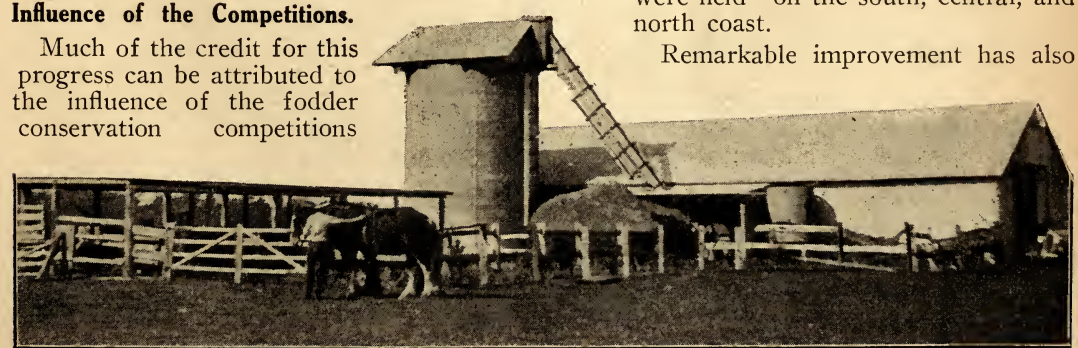
H. C. Stening, H.D.A., Chief Instructor of Agriculture.

In the past decade there has been a considerable increase in the number of farmers in coastal districts who are conserving fodders, principally silage. In 1922-23 sixty-nine farmers made a total quantity of 6,598 tons of silage, while in 1932-33, 475 farmers conserved 31,996 tons of silage. Ten years ago it was possible to count on the fingers of one hand the number of farmers on the North Coast who were making silage; there are now 133.

Influence of the Competitions.

Much of the credit for this progress can be attributed to the influence of the fodder conservation competitions organised each year by local agricultural bodies, the winners in each centre being eligible to compete for the district championship promoted by the Royal Agricultural Society. This season twenty-nine societies conducted competitions, and the total entries numbered 142, both figures contituting records far in advance of the previous best. Thus, whereas previously it was only necessary to hold two championship competitions on the coast, this year three were held—on the south, central, and north coast.

Remarkable improvement has also



been made in recent years as regards the quality of the fodders conserved. All but five competitors relied on maize silage as the foundation of their fodder reserves. Many are the advantages of silage as conserved fodder for dairy cattle. Not only is it the nearest approach to pasture by reason of its succulence, palatability, and digestibility, but it permits of advantage being taken of summer-grown crops such as maize, which yield large quantities of fodder per acre. An average maize crop, when converted into silage, is capable of feeding more than four times the number of cattle that a similar area of good pasture will carry.

All Types of Silos.

Various methods for conserving silage were used, fifteen competitors had filled tower silos, which were constructed chiefly of reinforced concrete, but a few with cement blocks or bricks; ten conserved their silage by the trench method, five in pits, and three by the stack method. On account of its convenience, permanence, and efficiency, the tower silo is the most popular on dairy farms, and moreover it adds to the appearance of a farm; but there are some who favour the pit, chiefly owing to its lower initial cost. A pit 18 feet in diameter and 25 feet deep, the capacity of which was estimated at over 110 tons, was excavated and lined with single brick, plastered with cement, by contract for £83 10s. This is less than half the cost of a concrete tower silo of similar capacity. Moreover, an elevator is not required, as the fodder can be chaffed directly into the pit. The difficulty of obtaining suitable sites for deep excavations on some farms will limit the application of this method, and it is probable that more trouble will be experienced in removing the silage from the pit than from a tower silo, but this could be reduced with suitable lifting gear.

Trench Silo Increases in Popularity.

The trench system continues to increase in popularity chiefly on account of its economy, as farmers are able to excavate a trench themselves, without any cash outlay. This method has proved very successful in coastal areas, and many farmers, after experience of the benefits of silage by this method are prepared to incur expenditure for the greater convenience of the tower silo. Of the three competitors who made silage in stacks, only one relied solely on this method, and all are convinced that this is a most uneconomical method owing to the excessive quantity of silage that is spoilt.

For economical feeding, silage requires to be supplemented with a fodder that is rich in protein in order that a balanced ration may be fed, and for this purpose lucerne or clover hay is the most suitable. One of the most encouraging results of the fodder conservation competition is the increased attention which is now given to the conservation of lucerne hay for combining with maize silage, and the fact that all but two competitors included lucerne hay in their fodder reserves is an indication of the progress that is being made as regards the knowledge of what constitutes economical feeding.

A Veritable Godsend.

The wisdom of the dairy-farmers's refusal to rely solely on what nature is pleased to provide was forcibly demonstrated by the experiences of the past season, when on some farms pastures and crops were completely destroyed by floods. In such instances reserves of fodders proved a veritable Godsend, as it is not only during the winter months and dry spells that conserved fodders are essential for maintaining production, but they are also an excellent standby when pastures and crops are destroyed by flood, fire or pest. It was, in fact, one of the most encouraging features of this year's competitions that twenty-five of the twenty-nine competitors had conserved ample fodder for the feeding of their herds for the five months during winter and early spring, *and had additional reserves to meet any scarcity of pastures that may occur at any other part of the year.*

South Coast Championship Won by Mr. Ken. Colless.

The following eighteen South Coast societies conducted competitions, that being five more than in the best previous year:—Albion Park, Bega, Bemboka, Berry, Bod-



Group of Concrete Silos on Col. T. E. W. Irwin's Farm near Bega.
Note the feeding stalls close handy.



Hay and Silage Reserves on Mr. K. Colless' Farm.
On the right can be seen the above-ground portions of two brick-lined pit silos.

alla, Camden, Candelo, Cobargo, Dapto, Eden, Exeter (Agricultural Bureau), Kangaroo Valley, Kiama, Moruya, Nepean (Penrith), Pambula, Shoalhaven (Nowra), Tilba Tilba (Agricultural Bureau).

RESULTS of the South Coast Fodder Conservation Championship.

Competitor.	Society.	Suitability.	Quality.	Location.	Protection.	Economy of Production.	Carrying Capacity.	Surplus.	Total.
Maximum points		30	35	20	20	25	60	10	200
Ken Colless, " Inverleigh," Emu Plains	Nepean (Penrith) ...	29	33	18	19	22	60	10	191
Colonel T. E. W. Irwin, " Erinna," Bega.	Bega	29	32	18	18	23	60	10	190
J. Masters, " Bundywalla," Berry ...	Berry...	28	33	19	18	23	60	8	189
W. A. Green, " Limerick Vale," Toowamba.	Eden	29	30	18	18	22	60	6	183
A. C. Brown and Sons, " Collingwood," Exeter.	Exeter (Agricultural Bureau).	23	32	18	18	23	60	9	183
Ray Brothers, " Wellington Park," Picton.	Camden	25	30	18	18	23	60	8	182
J. Fleming, " Balfron," Rocky Hall ...	Pambula	27	32	18	19	23	60	2	181
N. S. Bate, " Old Bodalla," Bodalla ...	Bodalla	28	31	17	19	23	60	2	180
H. A. Smart, " Glen Murray," Kangaroo Valley.	Kangaroo Valley ...	28	31	18	18	23	60	2	180
H. F. Sawtell, " Narira," Cobargo ...	Cobargo	28	31	17	18	23	60	2	179
O. Pearson, " Oakleigh," Albion Park...	Albion Park ...	26	31	17	18	23	60	2	177
J. E. Hawdon and H. J. Greig, " Home Farm," Kiora, Moruya.	Moruya	28	30	17	17	22	60	3	177
E. W. Paterson, " Woodstock," Jamberoo.	Kiama	23	31	18	19	23	60	2	176
J. M. Lamond, " The Willows," Terara...	Shoalhaven (Nowra)	27	30	17	18	22	60	1	175
E. H. Filmer, " Springvale," Candelo...	Candelo	25	30	17	18	22	60	...	172
Rolfe Bros., " Rye Field," Bemboka ...	Bemboka	26	30	15	18	22	60	...	171
E. T. Evans, " Penrose," Dapto ...	Dapto	26	32	17	19	23	50	...	167
H. J. Bate, " Mountain View," Tilba Tilba.	Tilba Tilba (Agricultural Bureau).	22	32	19	19½	24	47	...	163½

Mr. Colless was successful in winning the championship for the second year in succession. A large proportion of his property of 85 acres, situated on the Nepean River, is under cultivation with fodder crops; lucerne is established on 15 acres, maize for green fodder and silage is sown on 12 acres, maize for grain on 5 acres, sorghum on 7 acres, and oats for green feed on 5 acres.

Convenient to the commodious feeding stalls, silage to the amount of 238 tons is conserved in four pits, 20 to 25 feet deep, which are lined with brick plastered with cement—single brick for that part of the pit underground and double brick for the portion about 6 feet above ground. The silage was made chiefly of chaffed cornstalks and about 100 tons of chaffed sorghum, and is all of good quality. In a shed adjacent to the feeding stalls, 28 tons of lucerne hay of very good quality is neatly stacked, and in another shed 21 tons of lucerne hay and 17 tons of mixed lucerne and grass hay form an additional reserve.

With 8 tons of maize grain, the total quantity of fodder is sufficient for the feeding of 158 head of cattle for the stipulated period, or more than four times the requirements. The combination of fodders is satisfactory and the general protection and lay-out extremely good.

Colonel Irwin in Second Place.

Colonel Irwin has always been an ardent advocate of the conservation of fodder, and has closely contested the local competitions for several years. His entry was of a high standard and he is somewhat unfortunate in being defeated for the championship by the narrow margin of one point.

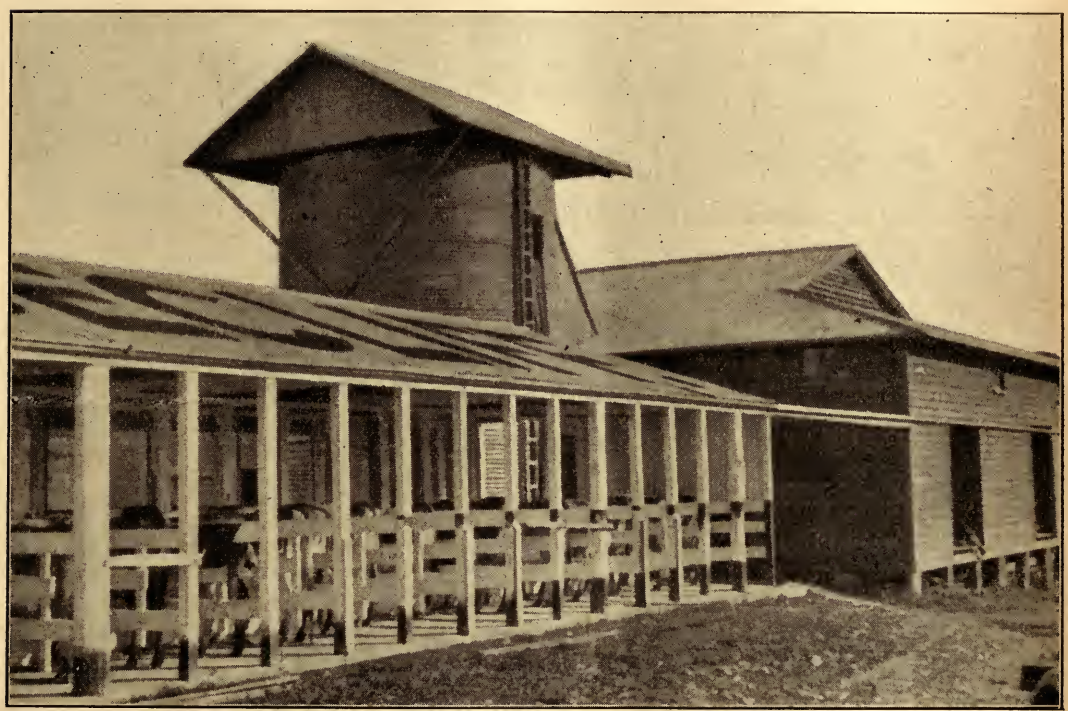
"Erinna" is a property of 320 acres, with which is included an additional lease of 129 acres, and the crops cultivated comprise 25 acres of maize for grain, 19 acres of maize

for fodder and silage, 16 acres of sorghum, 4 acres of oats, and 16 acres have been established with lucerne, and 30 acres with sown grasses.

A total quantity of 325 tons of maize silage is conserved in four concrete tower silos, which are in a line close to one another and adjacent to the feeding stalls. In addition 48 tons of lucerne hay and 17 tons of oaten hay are stored in a barn and 29 tons of maize grain, including cobs stored in a loft, and ground maize in small tanks. In the aggregate there is sufficient fodder for the five months' winter feeding of 226 cattle, equal to three times the natural carrying capacity. The quality is first-class and in every other respect the entry merited the high points awarded.

Mr. J. Masters, of Berry, Third.

For the second year in succession the third prize was won by Mr. J. Masters, of Berry. His property of 249 acres consists chiefly of second-class hill country, and on the more fertile portions he has established 4½ acres of lucerne, and grows 10 acres of maize for grain, 12 acres of maize for green fodder and silage, and 3 acres of sorghum.



This Excellent Layout is on Mr. W. J. Hammond's Farm at Bellingen.
Feeding stalls, silo and commodious barn.

The conserved fodders include 138 tons chaffed maize silage in twin concrete tower silos, 31 tons of lucerne hay and chaff in a barn, and 15 tons of maize, all located conveniently to the feeding stalls, and sufficient for the needs of 107 head of cattle for the required period, which is over 2½ times the carrying capacity.

The First North Coast Championship.

In previous years no more than three societies on the Upper North Coast organised competitions. It is therefore pleasing that there were sufficient entries this year,

namely, five, to conduct a championship competition. The societies which conducted competitions were: Bellinger River, Bonalbo, Casino, Clarence River, and Dorrigo.

RESULTS of the North Coast Fodder Conservation Championship.

Competitor.	Society.	Suitability.	Quality.	Location.	Protection.	Economy of Production.	Carrying Capacity.	Surplus.	Total.
Maximum points		30	35	20	20	25	60	10	200
W. J. Hammond, "Rosecliff," Bellingen	Bellinger River ...	29	32	20	19	22	60	5	187
W. T. Robinson, "Crown Farm," Grafton.	Clarence River ...	28	29	18	17	22	60	10	184
J. W. Gambley, "Maria," Old Bonalbo	Bonalbo	27	30	19	19	23	60	1	179
J. P. McDonnell, "Wimbledon," Tatham.	Casino	25	30	17	18	21	60	4	175
W. R. Winkley, "Paddy's Plains," North Dorrigo.	Dorrigo	27	30	18	18	23	58	...	174

The championship was won by Mr. W. J. Hammond, of Bellingen, at his first attempt, with a very creditable exhibit of fodders, the outstanding feature of which is the excellent lay-out to facilitate feeding and thus save time and labour.

His holding, which includes some of the fertile Bellinger River flats, is 169 acres in area, and lucerne is grown on 3 acres, maize for grain on 4 acres, maize for green fodder and silage on 6 acres, sugarcane for fodder on 5 acres, and there is a total of 66 acres sown with grasses.

The stored fodders comprise 72 tons chaffed maize silage, in a concrete tower silo, alongside the feeding stalls, and in an adjacent commodious barn is stacked 31 tons of meadow hay, 5 tons of paspalum hay, 9 tons of lucerne hay, and 4 tons of red clover hay, also 4 tons of maize grain. The whole is sufficient for feeding seventy-three cattle, which is double the natural carrying capacity.

Minor Placings to Grafton and Bonalbo.

The second prize was won by Mr. W. T. Robinson, whose property is 78 acres in area, and of which 24 acres are allotted to the cultivation of maize silage and grain, 2 acres to oats, and 4 acres to lucerne. A concrete tower silo contains 56 tons of maize silage, and in a shed, a loft, and stacks there are 26 tons of lucerne hay, 2 tons of lucerne and grass, 2 tons of oaten, 3 tons paspalum, and 5 tons of field pea hay, and in addition 8½ tons shelled maize is contained in two sealed tanks, and some bags, providing in all more than three times the amount of fodder required according to the needs of the competition.

Mr. J. W. Gambley, who won the third prize, has a property of 233 acres, and grows lucerne on 14 acres, maize for green fodder on 18 acres, oats on 10 acres, and sorghum on 5 acres. His fodder reserves comprise 93 tons silage, of which 82 tons of chaffed maize and lucerne are stored in one of twin concrete silos, and 11 tons in a stack, and 23 tons of lucerne hay, and 4 tons of oaten hay stacked in a shed. The whole of the fodder is conveniently situated and well protected, and is a little in excess of the requirements for five months' winter feeding.

Mr. E. L. R. Keech Wins First Central Coast Championship.

This is the first occasion on which there has been any representation in the competition from the Hunter River district, and the two societies which organised competitions were grouped with four in the Central Coast division for the purpose of the cham-

pionship. The societies which conducted competitions were Hunter River, Macleay River, Manning River, Upper Hunter River, Upper Manning River, and Wauchope.

RESULTS of the Central Coast and Hunter River Championship.

Competitor.	Society.	Suitability.	Quality.	Location.	Protection.	Economy of Production.	Carrying Capacity.	Surplus.	Total.
Maximum points		30	35	20	20	25	60	10	200
E. L. R. Keech, " Dungowan," Wingham	Upper Manning (Wingham).	29	32	19	19	21	60	9	189
J. W. Fisher, " Pickfair," Turner's Flat.	Macleay (Kempsey)	28	31	14	19	23	60	10	185
F. O. Stokes and W. G. Sawyer, " Brumarlin," Mondrook.	Manning River (Taree).	29	31	19	19	22	60	3	183
R. H. Strong, " Blairmore Point," Aberdeen.	Upper Hunter (Muswellbrook).	24	31	17	19	20	60	6	177
S. O. Masters, Raworth, *via* Morpeth ...	Hunter River (West Maitland).	24	31	15	19	20	60	3	172
H. Coombes, " Brunswick Hill," Gannon's Creek.	Wauchope	24	27	15	18	20	37	...	141

The championship was won by Mr. Keech, who improved upon his entry of the previous year, when he was awarded second prize. His farm of 58 acres consists entirely of rich river flats, and almost the whole of it is under cultivation for the production of fodder for the stock. Lucerne has been established on 17 acres, maize for fodder on 6 acres, maize for grain on 6 acres, sorghum on 3 acres, and oats on 6 acres.

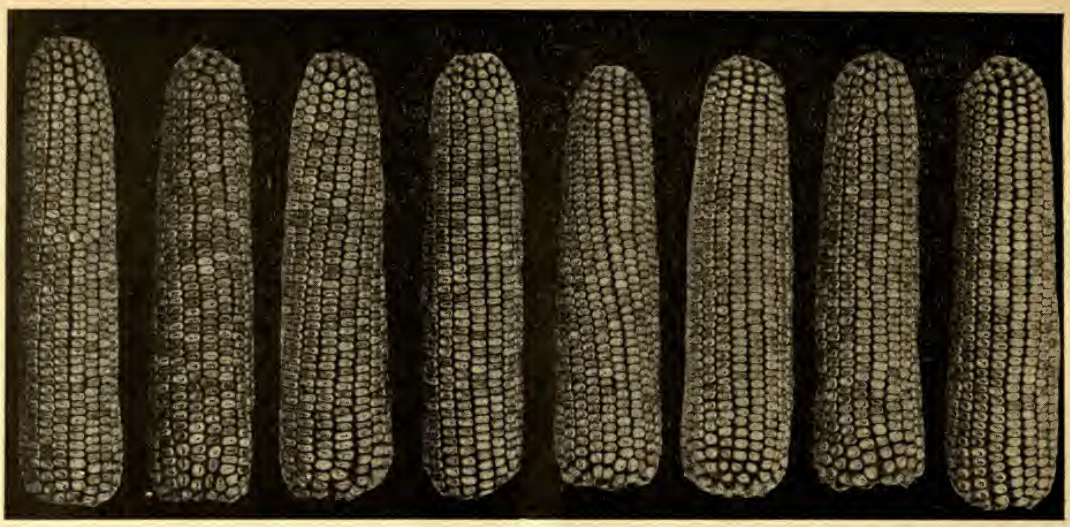
The fodder reserves comprise 60 tons of silage conserved in an oval concrete pit 20 feet deep, and of which 70 per cent. is lucerne and 30 per cent. wheat and oats; 65 tons of lucerne hay stacked in two sheds, and 11 tons of maize grain, making provision in all for the feeding of 107 head of cattle for five months or nearly three times the number of cattle the property is capable of carrying when under natural pasture. The general quality and combination of the fodders are of a high standard, and it is all conveniently situated and well protected.

Mr. J. W. Fisher, second; Messrs. Stokes & Sawyer third.

The second prize went to Mr. Fisher. His 100-acre property varies from rich river flats to high land of lower fertility, and he cultivates 8 acres with lucerne, 9 acres with maize for fodder, 12 acres with maize for grain, and 3 acres with sorghum. Two trench silos are filled with silage, one containing whole maize, and the other one-third maize and two-thirds sorghum with a layer of lucerne, and there was practically no waste, but a stack of paspalum grass silage showed the inevitable large proportion of spoilage. The total quantity of silage is 85 tons, and there are in addition 30 tons lucerne hay and 13 tons maize grain stored in a well-built shed, providing for the feeding of eighty-four cattle, which is three times the carrying capacity.

The third prize was won by Messrs. F. O. Stokes and W. G. Sawyer, who were successful in winning the championship of the previous year. The holding of 438 acres, which includes a lease of 240 acres, varied from fertile river flats to fairly poor forest country, and the best of the land is used for the cultivation of fodder crops, including 16 acres lucerne, 13 acres maize for fodder, 10 acres maize for grain, 5 acre of oats, 1 acre sorghum, and 2 acres cow cane; also 41 acres have been sown down with improved pastures.

Conveniently situated near the feeding stalls, 80 tons of maize silage is conserved in a concrete tower silo and 65 tons of lucerne hay in a large hay shed. There is also 4½ tons of maize stored in a barn, making in all sufficient for the feeding of 101 cattle, as compared with a natural carrying capacity of sixty-seven. The fodders are of high quality, and form a good combination to permit of the feeding of a balanced ration.



For Success with Maize.

Imitate the Most Successful Growers.

R.A.S. Maize Championships, 1933-34.

MAIZE production in New South Wales has declined considerably in the last ten years, showing a decrease of 57 per cent. between 1924 and 1934. The average acre yield during the same period has also varied considerably, showing a falling off in the last five years (except in 1930), as compared with the first half of that ten-years' period.

While some of the factors which influence yield are outside the control of the grower, the maize growing competitions carried out each year under the guidance of the Department, and for which the Royal Agricultural Society donates handsome prize money (£100 in total) point the way to better cultural methods and bigger yields.

The following interesting observations and records of last season's championship competitions are taken from the report of Mr. W. D. Kerle, Special Agricultural Instructor, who judged the championships.

IT is probable that the falling off in yield can be largely attributed to loss due to diseases, particularly root- and cob-rot diseases, which are much more widespread and severe than ten years ago. Furthermore, little is being done by growers to control these diseases.

Factors Affecting Yield.

Land which is not prepared early and thoroughly, unsuitable varieties, unreliable sources of seed supply, or seed which has been selected along incorrect lines are all factors which adversely affect yield.

These competitions afford an excellent opportunity to point out these shortcomings, whilst, during judging, the judge is able to indicate to competitors the nature of the different diseases, the essential features of seed selection, and the results of incorrect cultural practices.

A Variable Season.

Seasonal conditions can be a big factor in influencing yields. Last season conditions varied considerably throughout the State, and may be briefly summed up as good on the North and Central Coast and in the

Inverell districts, fair on the South-Western Slopes and upper South Coast, poor in the New England district, and very poor on the far South Coast.

With the exception of the Northern Tableland, where incessant rain prevented seasonable sowing under good conditions, the season was excellent up to the end of December. Frequent showers kept the maize growing strongly following an excellent germination, and growth in the early stages, particularly in coastal districts, was luxuriant. Heavy rain was experienced in January and February, causing floods in coastal rivers, the chief sufferers being growers on the river banks from Moruya to Eden. Serious damage by floods on the Hawkesbury, Murrumbidgee, Tumut and north and central coastal rivers was narrowly averted.



A Good Crop of Leaming.

Towards maturity rain fell much too frequently, and late crops, in particular, did not yield up to expectations, while grain quality also was affected. Leaf blight occurred much more frequently than usual, due to the nature of the season, and in late-sown, susceptible varieties the loss of yield was considerable.

DETAILS OF THE COMPETITION.

The Central Coast.

Five societies competed in the Central Coast Championship this season, the Hastings River P. and A. Association making its initial attempt.

The following table shows the points awarded the winners of the local contests and their placing in the championship:—

AWARDS in Central Coast Championship.

Scale of Points.	*Maximum Points.	E. H. McLeod, "Dunvegan," Tinonee. (Lower Manning Society.)	A. Inall, Richmond. (Hawkesbury Society.)	J. C. Jeffrey, Riverstone, Turners Flat. (Macleay Society.)	A. and J. Andrews, Woodside via Wingham. (Upper Manning Society.)	N. Hollis, Wauchope. (Hastings Society.)
Germination and Stand ...	10	8	9½	7	8	7
Freedom from Weeds	20	16	15½	15	14	16
Condition and Appearance ...	10	8	8	7	8	8
Freedom from Insects and Diseases	20	16½	17½	13	15½	18
Purity and Trueness to Type ...	20	16½	14	12	15	13
Yield	3 points per 10 bushels.	30	28½	36	28½	27
Total	...	95	93	90	89	89

In the development of maize growing in this and other sections of the State, it is important that growers should familiarise themselves with the characteristics of the maize variety types suitable to their localities, and to follow a definite system of seed selection to develop strains suited to their conditions and to assist in the fight against the inroads of parasitic diseases.

The South Coast.

Considering the adverse nature of the season, particularly south of Nowra, where successive floods in the summer months

completely destroyed maize on river flats, the local competitions were keenly contested. The entries, however, were largely confined to crops on upland soil, and the yields, although excellent for this class of soil, were much below normal for the district and in these competitions, the Eden entry, for example, yielding 65 bushels as against 120 bushels last season.

The points awarded the district winners who competed in this championship were as follows:—

AWARDS in South Coast Championship.

Competitor and Society.	Variety.	Germination and Stand.	Freedom from Weeds.	Condition and Appearance.	Freedom from Insect Pest and Diseases.	Purity and Trueness to Type.	Estimated Yield.	Total.
Maximum Points ...		10	20	10	20	20	3 points per 10 bushels.	—
J. M. Lamond (Shoalhaven) ...	Hickory King ...	8	18	8	14½	16	34½	99
J. Graham (Kangaroo Valley) ...	Hickory King ...	7	15	8	16	16½	33½	96
H. E. Dowle (Camden)	Fitzroy	8	19	8	16	14½	28½	94
J. A. Martin (Pambula)	Funks Yellow Dent	9	17½	8½	15	16½	24	90½
T. E. W. Irwin (Bega)	Hickory King ...	8½	17½	9	16	17	19	87
J. F. Cochrane (Candelo)	Bega Yellow ...	7½	16½	8½	15½	13	25½	86½
W. R. Mitchell (Eden)	Leaming	9	19	8½	15	14½	19½	85½
A. Loutitt (Moruya)	Fitzroy	8½	18	8½	14	13½	19½	82

For normal conditions when sowing maize for grain, 3 feet apart must be considered too close, even on rich alluvial flats. The success of thick planting in this district this season was due chiefly to the abundance of rain.

The North Coastal Championship.

The winners of the local competitions at Kyogle, Casino, Bellingen and Dorrigo, provided the finalists in the championship competition for the North Coast Division. In this section of the State ideal seasonal conditions prevailed for the first three months after planting, but heavy and too frequent rainfall had a very adverse effect in the later stages of growth. At Dorrigo, rain fell on thirty-seven days, and 46.27 inches were registered from 1st January to 31st May, 12.70 inches of which fell during May.

The points awarded in this championship were as follows:—

AWARDS in North Coast Championship.

Scale of Points.	Maximum Points.	R. Hicks, Gordonville. (Bellingen Society.)	Campbell Bros., Lynch's Creek. (Kyogle Society.)	J. G. Payne, Casino. (Casino Society.)	H. Grace, North Dorrigo. (Dorrigo Society.)
Germination and Stand	10	8	8	8	7½
Freedom from Weeds	20	16½	18	18	17
Condition and Appearance ...	10	8	7	8½	7½
Freedom from Insect Pest and Diseases	20	17	17	14	15½
Purity and Trueness to Type ...	20	15½	16½	15½	15
Estimated Yield	3 points per 10 bushels.	28½	25½	27	19½
Total	...	93½	92	91	82

A general review of the competition results in this division suggests the stressing of the facts that early preparation of the soil, careful seed selection, and a better understanding of the causation and control of fungous diseases parasitic upon maize

than at present obtains, are essential if profitable returns are to be achieved. In the case of one competitor, the crop was grown on the same land as last year's entry, and whereas last year little root-, stalk- or cob-rot diseases were present in the paddock, the result of the rotation of crops consistently followed up to that stage, this year the crop developed a fair amount of the disease.

Northern Tableland and Inverell.

Five societies in this area conducted local competitions, a total of forty-two entries being received. In view of the continuously wet conditions in spring and early summer, which considerably hindered cultural and sowing operations, the interest evinced in the competitions was commendable.

The awards made were as follows:—

AWARDS in Northern Tablelands Championship.

Scale of Points.	Maximum Points.	G. B. Koch, "Happy Valley," Steinbrook. (Tenterfield Society.)	G. H. Eddy, "Lynden," Rob Roy. (Inverell Society.)	G. Mott, "Glendon," Wellingrove. (Glen Innes Society.)	R. Rowlings, "Bronte," Dangarsleigh. (Armidale Society.)	J. J. Shanahan, "Hillview," Salisbury. (Uralla Society.)
Germination and Stand ...	10	9	9	8½	8	8½
Freedom from Weeds	20	17	20	17½	19½	18½
Condition and Appearance ...	10	9	8½	9	8½	7½
Freedom from Insects and Diseases	20	17½	17½	17	16½	17½
Purity and Trueness to Type ...	10	17	16½	15	16	13
Yield	3 points per 5 bushels.	45	42	45	42	39
Total	...	114½	113½	112	110½	104

In comparison with coastal crops, New England and Inverell areas are conspicuous for their freedom from fungous diseases of the root-rot type. This is no doubt due to the rotation with oats or other crops, which is a general practice, and to the general destruction of stalks on which the disease is carried over from one season to another.

South-Western Slopes.

The championship in this division was competed for by Gundagai and Tumut growers this year, the season in other localities within the area not being conductive to high yields, or the growth of competition blocks. Competition crops, however, were of high standard, the six entries at Gundagai averaging 102½ bushels per acre, and eight at Tumut averaging 97½ bushels per acre.

In the Gundagai local competition evidence of field infestation of the Angumois moth was seen, due to the carry-over in open cribs of last season's crop, which served as a breeding ground for infestation of the standing crop this season.

The awards were as follows:—

AWARDS in the South-western Slopes Championship.

Scale of Points.	Maximum Points.	Elworthy Bros., Tarabandra. (Gundagai Society.)	G. W. M. Sturt, Tumut Plains. (Tumut Society.)
Germination and Stand	10	9	9½
Freedom from Weeds...	20	19	18
Condition and Appearance	10	9	9
Freedom from Insects and Diseases ...	20	16½	16½
Purity and Trueness to Type	20	15½	18
Yield	3 pts. per 5 bushels.	69	69
Total	...	138	137

More Financial Assistance Required for Fodder Conservation.

State-wide Fodder Conservation Conference.

THE national importance of fodder conservation was stressed by almost every speaker at the State-wide Fodder Conservation Conference convened by the Royal Agricultural Society, and held in Sydney last month. As a result of these deliberations it is confidently expected by the farmers who attended that one result will be substantially more financial support for the bodies organising fodder conservation competitions and also for the farmer desiring to store fodders.

Lieutenant-Governor Opens the Conference.

The conference was officially opened by His Excellency the Lieutenant-Governor (Sir Philip Street), who was supported in his opening remarks by the Hon. M. F. Bruxner, M.L.A. (Minister for Transport), representing the Premier. Sir Samuel Hordern, President of the Royal Agricultural Society, presided. The conference was attended by representatives of the farming, business and financial communities interested in this most important aspect of sound farming. Experts and field officers of the Department also attended.

Fodder Conservation Ensures National Stability.

"In a country such as New South Wales, which is so subject to the vagaries of the weather, fodder conservation is of the greatest importance in maintaining the prosperity of the individual and the solvency of the State," said Mr. Bruxner, who went on to point out that at the beginning of the century there were sixty million sheep in New South Wales and that shortly afterwards twenty millions had been lost through feed and water shortage. There had also been a loss of seven million sheep between 1927 and 1930. Valuing this last-mentioned number at 10s. a head, it meant a loss of £3,500,000 to the State. These appalling losses should, and could, be prevented, he asserted, by fodder conservation.

A National Necessity.

It was unanimously agreed, on the motion of Mr. G. W. Walker, to affirm the principle that it was a national necessity that every effort should be made systematically to conserve fodder in all branches of the pastoral and agricultural activities of the State, and that the proper place for conservation of fodder was on the farm.

In seconding this resolution, the Hon. F. A. Chaffey (Chief Secretary) stressed the point that fodder conservation was so much a national question that every commercial man and financial institute should interest themselves in the matter.

Finance the Stumbling-block.

It was not want of confidence in the system advocated, nor disinclination on the part of farmers that operated against the more general adoption of fodder conservation; it was generally a question of finance. He suggested that the banks might give more consideration to the question of advancing funds to enable farmers to put by reserves of fodder for times of scarcity.

Other speakers also stressed the point that in preventing the heavy losses occasioned by droughts, institutions assisting in this matter were really preserving the nation's most valuable assets, the primary industries.

An Appeal for Financial Assistance.

It was unanimously resolved on the motion of Messrs. F. B. Hinton (Canowindra) and T. E. W. Irwin (Bega) that the R.A.S. be requested to make a special appeal to all financial institutions and other bodies interested to (1) assist the man on the land to safeguard his interests by making adequate provision to conserve fodder to meet times of adversity, and (2) financially support the R.A.S. fodder conservation competitions to enable them to be extended throughout the State.

Addresses were given on various aspects of fodder conservation by Professor R. D. Watt, Mr. Anthony Brunskill, Mr. H. C. Stening, and Lieutenant-Colonel G. C. Somerville. The proceedings were reported in full and are available in booklet form from the Royal Agricultural Society, Endeavour House, Macquarie Place, Sydney.



French Bean Production is an Important Industry.

A. C. Orman, H.D.A., Agricultural Instructor.

The cultivation of beans for marketing as green beans or snap beans is a very important industry in New South Wales, approximately 2,000 acres being planted annually. Although coastal districts account for the bulk of this area, inland growers, with the aid of irrigation, have, in recent years, devoted more attention to the cultivation of the crop, beans having been grown quite successfully on the Murrumbidgee Irrigation Area and at Wellington and Dubbo, both for green beans and seed.

This leguminous crop is an excellent soil renovator, and is particularly valuable in a rotation, and, where practicable, should be considered for such purposes. On the coast many orchardists and banana growers with young plantations, utilise the area between the rows to produce beans as a catch crop, with payable results.

The area grown by individual farmers varies considerably, but 1 to 2 acres is considered sufficient for one grower to handle, providing he gives the crop the care and attention that it demands. At the present time the biggest problem with which the bean grower has to contend is disease, such diseases as bacterial blight and mosaic, which are carried in the seed, making it imperative for the successful grower to give the seed question the most exacting attention. Where practicable, the grower is advised to grow his own seed requirements, but, if he is not able to do so, he should only purchase seed of known quality, that is seed of which he knows the past history. Failure to do this may mean partial if not complete loss. It is essential for the bean grower to become familiar with the common diseases, so that he can rogue the affected plants as they appear.

The chief bean-growing centres of the State are: North Coast (Murwillumbah and Tweed Heads); Central Coast (Gosford and Wyong districts); the South Coast (Nowra); and the Far South Coast (Bega, Kiah and Pambula); and to a lesser extent the Murrumbidgee Irrigation Area, the Western district (Dubbo, Wellington), and Hunter River flats.

Soil and Climate.

With the aid of fertilisers, the crop can be grown on many types of soils, but well-drained easily-worked, dark sandy loams and alluvial loams are perhaps the most satisfactory. The bean growing soils of the North Coast are mainly of basalt origin. Clayey soils are not suitable, and low-lying situations planted to beans require attention as regards drainage, which, if neglected, results in the plants becoming yellow in colour during wet periods.

As beans are very susceptible to frost, they can only be grown successfully during the warm periods of the year, or in frost-free situations. The absence of very hot or cold weather at the flowering stage is essential, because such conditions interfere with the pollination of the flowers, and, of course, the subsequent setting of the crop. A cold snap will invariably cause the young pods to curl or hook, wither, assume a yellow colour and eventually drop off. Extremes of temperature such as very hot or cold winds, may also have a "scorching" effect on the plants, thus hampering growth.



Canadian Wonder—A Heavy Bearer.

The most suitable localities for the production of very early beans are those situated along the coast, which are well elevated, with a north-easterly to northerly aspect, frost-free and protected from the prevailing southerly and westerly winds.

Preparation of the Land.

On the North and Central Coast districts, where the earliest beans are grown, the bulk of the cropping is carried out on steep hillside country, which frequently calls for much hand preparation. As this class of land, more particularly in the Wyong and Gosford districts, is subject to severe washing during heavy rain, drains have to be constructed by hand to provide for surface drainage. These drains which are usually 18 inches wide at the top grading down to 9 to 12 inches at the bottom, and 1 to 1½ feet deep, are run gently across the slope, the number of drains and depth depending on the grade of the land, type and condition of the soil, etc. Lateral drains are sometimes necessary also. The construction of the drains where required is the last preparation given the land before planting. Where possible it is advisable to give the area at least six weeks' preparation, so as to obtain finally a fine, moist seed bed. On the North Coast, in many places it is not possible to give the soil a thorough preparation, owing to its stony nature. It is important to maintain the humus content of the soil, and check erosion (especially on hillside country), by sowing green manure crops, such as peas, cow-peas, vetches, etc., during the off season.

Time of Sowing.

On the Far North Coast the first sowing usually begins at the end of February, and proceeds until the end of July. Very few growers plant later on account of the dry spring frequently experienced, though beans may be sown at practically any time in this district. Growers around the Gosford and Wyong districts make it a practice to keep planting small areas from end of May to end of August, commencing on the highest situations, and working down on the lower land as the season progresses. Tumbi Umbi is the earliest centre in this district. September and October are not considered suitable sowing months because the resultant crop comes on to a well supplied market. Beans may be planted during the period November to March in this district also, but growers run a big risk of loss through bean fly infestation, especially during January and February. On most elevated, well sheltered coastal patches north of Sydney, early planting can be made without much danger.

On the South Coast—Nowra—sowing is rarely commenced before the end of September, while on the Far South Coast the principal sowing is carried out in November, although December and January are both very suitable sowing months.

On the Hunter River, planting may be carried out as early as September, but in this district as well as in western districts

and on the Murrumbidgee Irrigation Area, best results are obtained by sowing in January or early in February, so as to avoid the hot winds and to catch the better market that usually obtains when the beans mature. Generally speaking, under ordinary conditions beans should not be planted until all danger of frost has passed.

Sowing Methods.

The seed is planted in shallow drills 30 to 36 inches apart. Where possible it is advisable to run the rows north or north-east, with the object of allowing the sun to penetrate down the rows during the greater part of the day.

Drills may be either opened with the hoe or the Planet Junior implement—the latter being the quicker method. For early plantings the seed should be sown about 1½ inches deep at intervals of 3 to 4 inches, at the rate of approximately 1 bushel per acre for large seed. For varieties with seed similar to that of Feltham's Prolific, only about half of this quantity of seed is required. With late sown crops, when the soil is warmer and in a better condition for germination, the seeds may be planted 2 to 3 inches deep and spaced further apart, thus necessitating less seed.

Shallow planting is essential for early crops, as the soil is cold, and the seedlings being weak, are unable to push their way through any depth of soil; it may take a month for the beans to show through, as against a week or ten days for the main crop. In abnormally wet and cold years, much seed decays, hence the necessity for close planting of the early crops. Some growers, by adjusting the mechanism, use the ordinary single horse seed drill to sow the seed, with fair results.

Fertilisers are Recommended.

If it is necessary to apply lime, especially on old land, it should be thoroughly incorporated with the soil at least a month prior to sowing.



Young French Beans on Fairly Steep Land in the Gosford District.
Note the surface drains to prevent washing of the soil.

In recent experiments conducted by the Department in the Gosford and Wyong districts, on light soils, excellent results were obtained with a mixture consisting of three parts of superphosphate and one part sulphate of ammonia, at the rate of 746 lb. per acre. This mixture was applied in two dressings, half the quantity being used at planting time, and half as a side dressing just prior to hilling. Some growers have also used blood and bone manure in conjunction with the above fertilisers with good results. Although fertiliser delays maturity a little, its use can be recommended under practically all conditions.

When applying fertiliser care should be taken to see that germination is not interfered with by the fertiliser injuring the seed

through coming in direct contact with it. To avoid this, the manure should either be thoroughly mixed with the soil prior to planting, or applied along a drill closely adjacent to the seed furrow.

Care of the Growing Crop.

As soon as the plants are a few inches high, inter-row cultivation should be carried out. On the steep sloping areas, the rows are worked through with the hoe, but on the flat country the single horse cultivator should be used. The early cultivations should be deep, so as to improve the physical condition of the soil; but later when the plants begin to flower, the workings should be shallow, otherwise the roots will be injured. Frequent cultivations are advisable, especially for the early crops, in order to keep the soil loose, and so increase the soil temperature. It is not advisable to cultivate when the plants are wet, owing to the risk of spreading disease throughout the entire crop.

The rows should be hilled up when the plants begin to show flowers; this operation prevents the plants from being blown over, and ensures a greater feeding area for the surface roots.

Harvesting and Marketing.

Under favourable conditions the plants keep flowering over a considerable period, thus producing a regular supply of pods. Harvesting must commence as soon as the pods are of sufficient size, which necessitates going through the crop at frequent intervals. Picking may thus be extended over a period of two to three months. The beans are picked during the day and marketed with the least possible delay. Many growers, during the hot weather, damp the beans before despatching so as to prevent wilting, and so to enable the produce to be placed on the market in a fresh condition. If the pods are allowed to become too ripe, not only is that particular picking spoiled, but the cropping power of the plant is considerably reduced.

The pods are usually graded according to quality and marketed in special, open-mesh, 2-bushel bags, or in chaff bags holding 3 bushels. The North Coast growers have lately adopted the practice of consigning the beans in cases holding about 2½ bushels. By this method the beans, especially the stringless varieties, are said to open up in better condition.

Yields ranging from 100 to 400 bushels are obtained, depending on the time of sowing, locality, etc., but a good average yield would be in the vicinity of 150 bushels per acre.

Varieties of French Beans.

The varieties most commonly grown at the present time are:—

Canadian Wonder.—A heavy bearer of large, stringy pods, which carry well to market. Perhaps the most popular variety when good seed is procurable.

Tweed Wonder.—A selection from Canadian Wonder, with most of the latter's characteristics. The seed is not so kidney-shaped, but blunt at both ends. An excellent substitute for Canadian Wonder, and reported by some growers to be of superior yielding ability.

Feltham's Prolific.—A very popular variety with some growers. Besides having some resistance to disease, it is a heavy cropper, but the pods, though produced slightly earlier, are smaller than those of the two varieties already mentioned. Being a stringless variety, Feltham's is not so suitable for consigning to market over a long distance. This variety is particularly suitable for local market, and home gardens.

Blue Wonder.—Produces a heavy crop of purplish-coloured pods, which have a pleasing flavour when cooked. Suitable only for home gardens.

Due to the prevalence of the seed-borne diseases, bacterial blight and mosaic, there is a tendency on the part of growers to try out new varieties that are reputed to be fairly disease resistant. Varieties like Masterpiece (Afrikander) and Pale Dun have been tried with only moderate success, while such varieties as Stayley's Brown Beauty (Premier), Stayley's Surprise (Prince), New Discovery and Byer's Bush are at present undergoing tests for suitability for commercial purposes.

The Production of Bean Seed.

As mentioned earlier in this article, the bean grower should, if possible, produce his own seed supplies in an endeavour to overcome the problem presented by seed-borne diseases. The production of seed crops of beans will be the subject of a second article to appear in a later issue.



Below : **A Heavy Yield.**



Above: **A Good Crop of Factor Potatoes at Batlow.**

Heavy Yields of Potatoes.

Potato Crop Championships, 1933-34.

The Southern District Championship.*

RECORD yields were the order of the day in the potato crop competitions conducted in the Taralga, Crookwell and Batlow districts this season. Not only did the winning plot at Batlow yield at the rate of 17 tons 6 cwts. per acre—nearly 5 tons in advance of the previous State potato competition record—but the winning yields, as well as the average yields, in each of the three competitions finalised, were respectively the highest yet recorded since competitions were inaugurated in those districts, even though in previous years the area required to be submitted was only half an acre, as compared with 2 acres this year.

A very good season certainly favoured big yields, but growers can claim that much of the success is due to their efforts in seed improvement and advanced cultural practices.

As indicated above, an alteration was made this year in the conditions of entry to the R.A.S. Championship, competitors being required to submit plots 2 acres in area as compared with ½ acre in previous years. As was to be expected, the number of entries received was considerately smaller, but two local societies (Crookwell and Taralga) maintained the interest of the smaller growers by conducting competitions for entries of ½-acre plots, and allowing competitors who desired to do so, to submit 2-acre plots so that they would be eligible to compete in the championship. Batlow Agricultural Bureau adopted the new regulation as to size, and Wingello branch of that organisation amalgamated with the Berrima Society, so that actually the number of local competitions conducted was the same as last year.

* From report of the judge, Mr. A. J. Pinn, Special Agricultural Instructor.

Apart from local competitions, the entries received eligible for the Royal Agricultural Society championship, were as follows:—

	Preliminary Judging.	Final Judging.
Berrima	6	Nil.
Taralga	9	8
Crookwell	16	11
Batlow	16	15
Total	47	34

The Season.

In the case of Berrima, the season proved so unsuitable through an excess of rain with resultant low yields, that all plots were withdrawn. On the whole, however, the season must be regarded as a particularly favourable one, although by no means ideal, for a dry spell in March and an over-plus of rain at other periods, were respectively responsible for moth activity and outbreaks of foliage disease.

The points awarded in this championship competition were as follows:—

AWARDS in Southern District Championship Competition.

Competitor and Society.	Variety.	Yield per Acre.	Points Awarded.						
			Yield (5 pts. per ton).	Quality.		Freedom from Disease.		Purity.	Total Points.
				Appearance.	Cutting.	Tops.	Tubers.		
Maximum points	...	...	...	15	15	8	7	15	...
		t. cwt.							
J. Holmes, Batlow	Factor	17 6	86½	13¾	12½	7¾	6¾	14¾	142
A. H. Price and Sons, Crookwell ...	,, ...	12 10	62½	13¾	12¾	8	6¾	15	118½
W. J. McPaul, Taralga	,, ...	12 4	61	13¾	13¼	8	6½	15	117



A Close-up View of Portion of Mr. J. Holmes' Champion Crop.

It will be noted that high yields were obtained by all three district competition winners; in fact high yields resulted throughout, only one entry giving a yield lower than 5 tons per acre. The average yields in the local 2-acre competitions were as follows:—

	No. of Plots.	Average Yield.
		tons cwt.
Batlow	15	11 12½
Crookwell	11	9 13½
Taralga	8	8 5¾

The average yield of the Batlow entries constitutes a record for a local competition, being nearly two tons per acre in advance of the previous best. It is also interesting to note that the average yield of eleven of



A Potato-digging Scene.

these plots from "certified" seed was 12 tons 6 cwt. as compared with 9 tons 14¾ cwt. from the four "non-certified" seed plots.

The Winning Plot.

The championship honour went to the Batlow district where Mr. J. Holmes (manager, Mr. W. Glynn), won on his first entry. The area selected was new land—portion of an area of volcanic loam lying in a small valley and including the slopes on both sides. The soil was friable, and well supplied with organic matter.

First ploughing was given in June, and in the intermediate period before the second ploughing, two harrowings were given; later the area received a further harrowing.

Planting took place at the end of November, locally-grown "certified" seed of "double-set" size, which was cut, was used. The seed was previously stored in half cases under trees in order to effect greening. The sets were dropped after the plough, the average number of rows to the chain being twenty-eight and a half. No fertiliser was used. The after-cultivation consisted of a harrowing immediately after planting and again when the tops were above ground.

A very vigorous crop resulted (approximately 4 feet), which at all times looked a winner. The general appearance of the tubers was excellent, and the loss from pests and disease was negligible.

The Crookwell Entry.

Messrs. Austin Price and Bros.' crop was the result of continuous attention to field selection and rogueing. It was grown on an area of basalt country which had not been cropped for thirty years. The preliminary ploughing was given towards the end of August, and the area was harrowed twice before planting on 23rd November.

The seed ranged from 2 to 6 oz. tubers which were mostly cut, dropped after the plough in furrows twenty-eight to the chain. It was stored in a "pit" until dipped in corrosive sublimate, and was then allowed to stand in bags in the open.

The area was harrowed on 24th November and again on 15th December. Fertiliser was applied by drill on the surface



Farmers Interested in the Judging of Crops.

just when the plants were breaking ground, the dressing consisting of superphosphate at 180 lb. per acre.

The crop was a very vigorous, healthy one, and was a "picture crop" at all times during its growth. For the variety the cutting quality was very good.

A Wet Season at Taralga.

Had the season been a little less wet, yields would have been considerably higher even than they were at Taralga, since conditions favouring blight caused early mortality of the top growth.

Mr. W. J. McPaul, who also won this competition on a previous occasion, again won with a double-figure yield. For his plot he selected an area of new land, first ploughed in August, and given three harrowings before planting on 7th-14th November, rows being spaced approximately twenty-eight to the chain.

Selected seed was used, which was previously spread out to green. The sets were dropped in the furrow after the plough and an application of 250 lb. superphosphate per acre was given. Three harrowings and one cultivation were given after planting.

The cutting quality of the tubers was excellent for the variety.

The Western District Championship.*

Four agricultural associations, namely, Oberon, Blayney, Millthorpe and Orange contested the 1933-34 Royal Agricultural Society's Championship for the Western district.

At the first inspection, during the end of January and early February, a total of twenty-four entries was inspected for the local competitions, but of this number only fourteen were submitted for final judging, being distributed as follows:—Oberon 3 entries, Blayney 1, Millthorpe 7, and Orange 3 entries. These crops had an average yield of 7 tons 18 cwt. per acre, which must be considered very satisfactory.

Generally speaking the season was a very favourable one, well distributed rains and good growing conditions being experienced from November to the end of February. March, however, was very dry, no effective rain being registered for the month, and this condition, associated with hot weather and also frosts, caused termination of growth in many plots.

The hot weather also favoured potato moth activity, but the degree of infestation varied considerably, being influenced to some extent by the time of planting and the type of soil, an early-sown crop on a stony or gravelly soil being the worst affected. Some growers reduced their losses by rolling the crop, or stocking the area heavily with sheep just before the moth became active, with the object of compacting the surface soil to prevent "grub" entry.

The Awards.

The points awarded to the winners of the local contests, who competed in the championship competition, were as follows:—

AWARDS in Western Districts Championship Competition.

Competitor and Society.	Variety.	Rows per chain.	Yield per acre.	Points Awarded.						
				Yield (5 points per ton).	Quality.		Freedom from Disease.		Purity.	Total Points.
					Appearance.	Cutting.	Tops.	Tubers.		
Maximum points ...		...	...	...	15	15	8	7	15	...
			t. cwt							
A. G. Kingham, Millthorpe ...	Factor	27¼	11 4	56	13	13	7¾	6½	15	111¼
A. G. Kingham, Blayney ...	,, ...	28	11 0	55	13½	13	7¾	6¾	15	111
F. E. Harvey, Oberon ...	,, ...	41	8 8	42	13	13	7¼	6½	15	96¾
M. Hiney, Orange	,, ...	27½	8 3	40¾	13¼	13¼	5¾	6½	15	94½

The average yield of these championship crops reached the satisfactory total of 9 tons 13¾ cwt.

* From the report of Mr. A. C. Orman, Agricultural Instructor, who judged this competition.



The Crop with which Mr. A. G. Kingham won the Championship.

Notes on the Crops.

Mr. A. G. Kingham, "Ashley," Blayney, who was runner-up in last year's championship, won the contest this year with an entry of Factor which won the Millthorpe local competition. His plot was located on new land, a chocolate basaltic loam. The initial ploughing was given during the second week in September, and the plot harrowed end September, cross-harrowed early October and cultivated both ways in mid-November.

Planting was carried out on 27th November, when seed ranging from 1¼ to 6 oz. was dropped from the plough and covered with approximately 6 inches of soil. A proprietary nitro-phosphatic fertiliser was drilled in at the rate of 1½ cwt. per acre prior to planting. The after-cultivation consisted of a harrowing on 16th December.

The harvested tubers were clean, practically free from second growth and moth, of good shape, and altogether formed an attractive commercial sample.

Mr. Kingham also won second prize, with a plot of Factor entered in the Blayney Society's competition. The cultural details of this entry were similar to those of the champion plot.

The winner of the Oberon Society's competition, Mr. F. E. Harvey, of "Sunny Point," was placed third with an entry located on new ground—a free-working granitic loam. The first ploughing was carried out in August and the plot worked with the springtooth cultivator. Planting was carried out in mid-November, both cut and whole seed, 3 to 6 oz. in weight, which had been stored in pits over the winter, being dropped by hand after the plough. The plot was harrowed after planting.

Despite the very close row planting, the plot yielded a high percentage of marketable tubers—the average size, however, was slightly smaller than in the other local plots.

It is pleasing to note the all-round improvement that has occurred in potato crops grown in the western district in the past two years, and this has largely been due to the influence of these competitions.

"If I were asked to state what I regarded as one of the first essentials to successful farming in this State, I would feel bound to favour conservation of fodder," said Mr. Anthony Brunskill, of Wagga, at last month's State-wide Fodder Conservation Conference convened by the Royal Agricultural Society.

Pure Seed.

Growers Recommended by the Department.

THE Department of Agriculture publishes monthly in the *Agricultural Gazette* a list of growers of pure seed of good quality of various crops in order to encourage those who have been devoting attention to this sphere of work, and to enable farmers to get into direct touch with producers of such seeds.

A grower's name is added to the list only (1) after the crop has been inspected during the growing period by a field officer and favourably reported upon, and (2) after a sample of the seed has been received by the Under-Secretary, Department of Agriculture, Sydney, and has satisfactorily passed a germination test

Intending purchasers are advised to communicate direct with growers regarding the price for the seeds mentioned hereunder. In the event of purchasers being dissatisfied with seed supplied by growers whose names appear on this list, they are requested to report immediately to the Department.

Pure seed growers are required to furnish each month a statement of the quantity of seed on hand. Such statement must reach the Department, Box 36a, G.P.O., Sydney, not later than the 12th of the month.

Maize—	
Fitzroy	Manager, Experiment Farm, Grafton.
Funk's Yellow Dent	J. A. L. Thompson, South Gundagai.
Golden Glow	R. Baker, Lochinvar.
	M. P. O'Brien, Lochinvar.
Leaming	Manager, Experiment Farm, Grafton.
	C. L. Chapman, Elderslee, via Branxton.
Sudan Grass	R. M. Broke, 19 Matthew-st., West Tamworth.
Potatoes ("Certified" and "Standard" Seed)—	
Early Manhattan	Secretary, Potato Section, Rural Co-operative Society Ltd., Orange.
	Secretary, Potato Growers' Association, Millthorpe. (Certified Seed only.)
Factor	Secretary, Potato Growers' Association, Bannister.
	Secretary, Potato Section, Rural Co-operative Society Ltd., Batlow.
	Secretary, Potato Growers' Association, Taralga.
	Secretary, Potato Section, Rural Co-operative Society Ltd., Orange. (Certified Seed only.)
	Secretary, Potato Growers' Association, Millthorpe. (Certified Seed only.)
Late Carman	Secretary, Potato Growers' Association, Bannister. (Standard Grade only.)
	Secretary, Potato Growers' Association, Millthorpe. (Certified Seed only.)
Late Manhattan	Secretary, Potato Section, Rural Co-operative Society Ltd., Orange. (Certified Seed only.)
Satisfaction	Secretary, Potato Growers' Association, Taralga.
Beans—	
Tweed Wonder	M. M. Scott, Wallendbeen.
	P. Morandini, Bunglegumbie-road, Dubbo.
Canadian Wonder	E. Kennett, Narellan.
Cucumbers—	
Early Fortune	W. Parry, Terrigal.
Crystal Apple	E. F. Ritter, Wyong.
Tomatoes—	
Sunnybrook Earliana	A Sorby, Narellan.
Break-o'-Day	A. Sorby, Narellan
Bonny Best	P. Morandini, Bunglegumbie-road, Dubbo.
Onions—	
Hunter River Brown Spanish	P. Morandini, Bunglegumbie-road, Dubbo.
	S. Redgrove, "Sandhill," Branxton.
Hunter River White	P. Morandini, Bunglegumbie-road, Dubbo.

Poisonous Plants.

Circumstances Under Which Losses May Occur.

H. R. SEDDON, D.V.Sc., Director of Veterinary Research.

AMONG the many problems which confront the primary producer is that of poisonous plants which may be responsible for considerable ill-health and mortality of stock. It is probable that many of the losses which, in times past, were attributed to such diseases as anthrax, were, in fact, brought about by the animals eating certain plants.

It may not be generally realised how extensive is this problem, and, therefore, a review of the varying circumstances under which these losses may occur may be appropriate.



Flowering Shoot of *Acacia glaucescens*.

(One-third natural size.)

A Serious Problem.

Poisonous plants present a serious difficulty because any animal which derives the whole or part of its food directly from plants may at some time be poisoned. Thus, cattle, sheep, horses, pigs and goats—all the farm animals except the dog and cat—are susceptible to poisoning in this way. Fortunately, in Australia hay rarely contains poisonous plants, and, as grain is usually well cleaned, there is little danger from either of these. Horses and cattle fed on these conserved fodders may, however, be poisoned during such opportunities as they have for grazing, or, as has happened, from getting access to garden refuse.

Poison plants are not confined to any one part of the State. Whilst they are common in our virgin brush country, occurring frequently also on the rolling plains of the west, they nevertheless grow on cultivated ground, and even in our gardens.

The number of stock poisoned at one time depends, of course, chiefly on the amount of plant available. In a number of cases the circumstances are such that only an odd or a few animals are poisoned. In other cases, unfortunately, the plants are available to larger numbers, and even hundreds of sheep may be poisoned at the one time.

An Ever-growing List.

Though we are now able to recognise perhaps the majority of poisonous plants, it is certain that we do not yet know them all. From time to time we have some new plant brought before us at Glenfield Veterinary Research Station as suspected. In some cases the suspicion cannot be sustained by experiment, but at other times careful testing proves its harmfulness, and another plant is added to the list of poisonous plants.

When a plant is found to be poisonous, the fact is made known, but naturally it is not possible to acquaint all stock-owners where it grows as to its harmfulness. Even were we able, it would not necessarily be possible for them to take steps to guard against stock eating it.

Whilst in the older, more closely-settled countries, and the same may be said for parts of this State, stock commonly graze only on grasses and other herbage intentionally planted for them, generally in Australia there is a considerable amount of what is termed herbage feeding. Thus, for

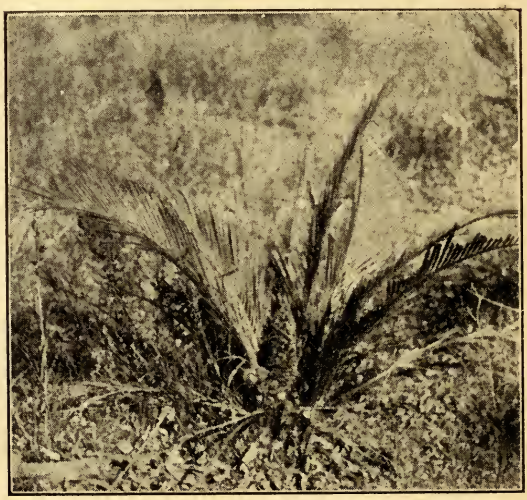
long periods, if not at all times, in most parts of this country stock live entirely on plants which grow naturally. Among these, unfortunately, are a number of poisonous plants.

Eradication Mostly Impossible.

That brings us to what is perhaps the most serious aspect of the poisonous plant problem, namely, that the occurrence and distribution of poisonous plants is so extensive that their eradication, except in the case of a few, is impossible. Impossible, also, is it to prevent stock getting access to these plants. Often the country on which they grow is otherwise good grazing land and must perforce be utilised. In other cases the poisonous plants grow on stock routes along which animals must be travelled. To guard against them under present conditions, therefore, we can only make their characteristics widely known, and, armed with that knowledge, stock-owners and drovers can, and do, prevent many losses.



Sheep Poisoned by Burrawang Seeds.



Burrawang (*Macrozamia spiralis*) Showing Fruiting Cone at Base.

Some readers may wonder how stock come to eat poisonous plants. We know that animals have an acute sense of taste, and the question may be asked: "Are not stock able to recognise by taste that the plant is harmful?" Many poisonous plants have a markedly acrid taste, and for that reason are avoided. Unfortunately, however, many are distinctly palatable. It is noteworthy that on country where a poisonous plant occurs the stock frequently avoid it, whereas animals strange to the country will partake of it. Some credit must, at times, therefore, be given for a discriminating sense. In other cases, however, the local stock are found to eat the plant with impunity, whereas strange stock are usually poisoned. Thus, in certain cases, stock may acquire a tolerance of a poisonous plant.

Poison Sometimes Slow Acting.

Not infrequently a plant is poisonous at one stage of growth but not at another, and unfortunately it is usually when the plant is young and most palatable that it is most toxic.

Even where a plant has some distinctive character by which the animal can recognise it, and even though it is already causing chronic poisoning, an animal, far from avoiding it, may acquire a craving for it, walking miles daily, searching for the plant.

Poisonous plants do not all cause serious, sudden illness and death; many cause only a slow, chronic poisoning. In some cases this brings about general weakness with eventual death, but in others the animals may make really good use of the plant as a food. They may fatten on the plant, and evidence of the poisoned system may be brought about only by enforced exercise, such as driving.

Poisonous Plants of the Coast.

Considering firstly those poisonous plants which are native to Australia, we may turn to the virgin bush country along the coast and on the coastal range. In these parts there is a tremendous variety of trees, shrubs and herbs. How many are actually poisonous we do not yet know, but stock turned out in this country are frequently poisoned.

Amongst the plants that we recognise as poisonous is the burrawang palm (*Macrozamia*). Stock eat the young fronds of this palm, especially after a bush fire, and in consequence of repeatedly feeding on it, acquire a cripply gait. The complaint is commonly called rickets, though it is not true rickets, which is a bone disease. The seeds of this palm, contained in the pine-apple-like cone, are also highly poisonous, but cattle rarely touch them. Eating these seeds, however, once led to the death of over 2,000 out of 6,000 travelling sheep.

"Sally Wattle," "Wild Peach," etc.

Along some of the coastal rivers, for example, the George's River near Liverpool, a very pretty wattle (*Acacia glaucescens*), known as "sally wattle," is found. The eating of a pound of green leaves by a cow would bring about its death in less than an hour. This does not often occur, as the leaves are usually out of reach of stock and other feed is commonly available. It has happened, however, when picnickers have broken down branches to gather the blossom, temptation has been put in the way of an animal, and it has succumbed from eating the leaves.

A small tree, known as "wild peach" (*Trema aspera*) is also poisonous; so is the corkwood tree (*Duboisia*). A vine (*Marsdenia rostrata*) causes symptoms like strychnine poisoning, and some other vines (*Passiflora* sp.) are also poisonous. Another poisonous plant is known as "wild cotton (*Asclepias fruitcosus*), but this has an acrid taste and is usually avoided by stock.

A yellow flowering pond weed (*Jussieua repens*) is almost certainly poisonous. On one property in the Camden district this weed grows in a dam, and from time to time dairy cows have been poisoned by eating it. Clover tree (*Goodia lotifolia*), a tree with yellow, pea-like flowers, growing from Eden to the Dorrigo, is poisonous, giving off prussic acid when eaten.

Beware Red-and-yellow-flowered Lantana.

Along certain of the northern rivers is a species of lantana having red and yellow flowers. This causes inflammation of the mouth and muzzle, jaundice and death. The common, pale-pink flowered lantana, so plentiful around Sydney and further up the coast, is not harmful.



Effect on Black and White Steer of the Ingestion of *Hypericum perforatum*, followed by Exposure of the Animal to the Sun.

Irritation is causing the animal to lick the affected area of unpigmented skin.

In the higher country we find a fern known as "rock fern," which also, it may be stated, grows on undulating and even flat, non-rocky country. This fern is poisonous, causing the animals to stagger when exercised. In parts of the Northern Tableland there is a grass known as "rough bearded grass" (*Echinopogon ovatus*), which, when eaten in the young state, causes severe nervous symptoms, so that animals become frightened, rush about and often die as the result of accident. This grass is harmless when it has seeded.

"Scrub Kurrajong," etc.

On one of the travelling stock routes, near Narrabri, is a shrub known as "scrub kurrajong" (*Pimelia pauciflora*), which, until recognised, led to the death of many sheep passing that way. A yellow daisy-

like plant (*Verbesina encelioides*) growing in the same district causes pneumonia in sheep.

Another plant well-known as a pest in certain parts of the Mudgee and Holbrook districts, viz., St. John's wort (*Hypericum perforatum*), is dangerous to stock. When they eat it they become sensitised to the sun, and so suffer an extremely severe and painful form of sunburn affecting unpigmented skin. The presence of pigment in the skin prevents this form of sunburn, but the white parts of dark animals, or animals with entirely white skins, are affected.

In a further instalment of this article, to appear in a subsequent issue, Dr. Seddon will deal with yet other poisonous plants, and discuss the seasonal influence upon their poison properties, the danger from poisonous garden escapees, and other aspects of the problem.

(*To be continued.*)

IN MEMORIAM.

Mr. E. N. WARD.

Died 19th August, 1934, aged 63 years.

IT is with deep regret that we record the death of Mr. E. N. Ward, Curator of the Botanic Gardens and Centennial Park, with whose passing the Department has lost an esteemed officer and local horticulture a widely-recognised authority.

A native of Yorkshire, England, in which country he received his early horticultural training, Mr. Ward came to Australia about forty years ago, taking up a position as an inspector in the Victorian Department of Agriculture. He joined the fruit inspection branch of the New South Wales Department in 1897, and subsequent to a term as gardener-in-charge at State Government House at Cranbrook became foreman of the Botanic Gardens. He was appointed Superintendent of the Gardens in 1914, and had occupied the position of Curator since 1924.

Mr. Ward was an artistic landscape gardener, and many verdant places testify to his gifts, for, in addition to his work for the Department, he acted in an honorary advisory capacity to numerous local government bodies, hospitals, and public institutions. The Minister for Agriculture, the Under-Secretary, and the staff of the Department join in this tribute to their late fellow-officer, and extend their sympathy to his family.

A Singleton farmer writing in appreciation of the *Agricultural Gazette* says: "Only a few months back I had about 1½ acres of cauliflowers and thought I would give them a top dressing. To find out the best I hunted through my file of the *Gazette* and in the December, 1931, issue I found out that a mixture of four parts superphosphate and one part sulphate of ammonia was recommended. This I used and later cut some great cauliflowers and cabbages, getting up to 12s. per dozen for them in the Singleton market.

Now that Cruising Speeds are in the FIFTIES—

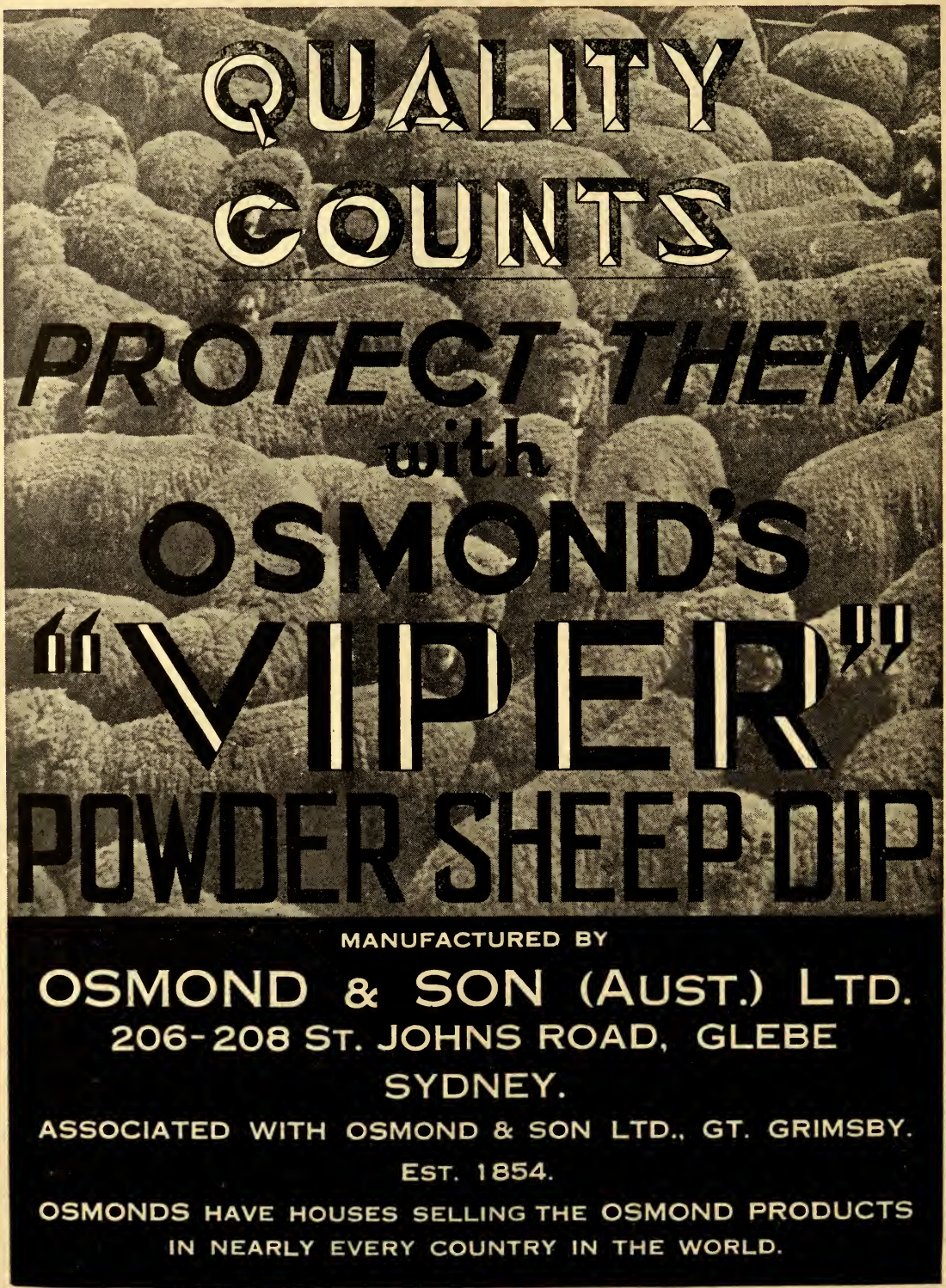
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Sheep Drafting Yards.

E. A. ELLIOTT, Sheep and Wool Expert, and
N. L. JONES, A.R.A.I.A., Supervising Architect.



Note Shade Trees in these Drafting Yards.

Yards Suitable for Small Flocks.

THE plans for drafting yards featured on the opposite page are suitable for flocks of up to 500 sheep. For larger flocks, say, up to 800 sheep, the same plans may be used as a basis and the yards enlarged either as indicated by the dotted lines or as convenience demands.

Although the plan shown is suitable only for a small flock, it has a two-way draft and a classing race which will be found very useful in the annual classing of the breeding ewes. Another valuable feature is that one yard for drafted sheep is exactly the size of one floor of a sheep van. Because of the variation in size of frame and length of fleece, we are never certain how many sheep will fill a truck. This yard will therefore be of assistance when sheep are being trucked to market.

The main requirements of sheep drafting yards are that they shall be of adequate size and embody a convenient and efficient drafting race. The simple drafting race has two yards opening from the end, a single gate being used to divide the sheep into two groups. As it is often necessary to make more than two groups it is usual to have at least three yards open from the end of the race, two gates being operated by the person drafting the sheep.

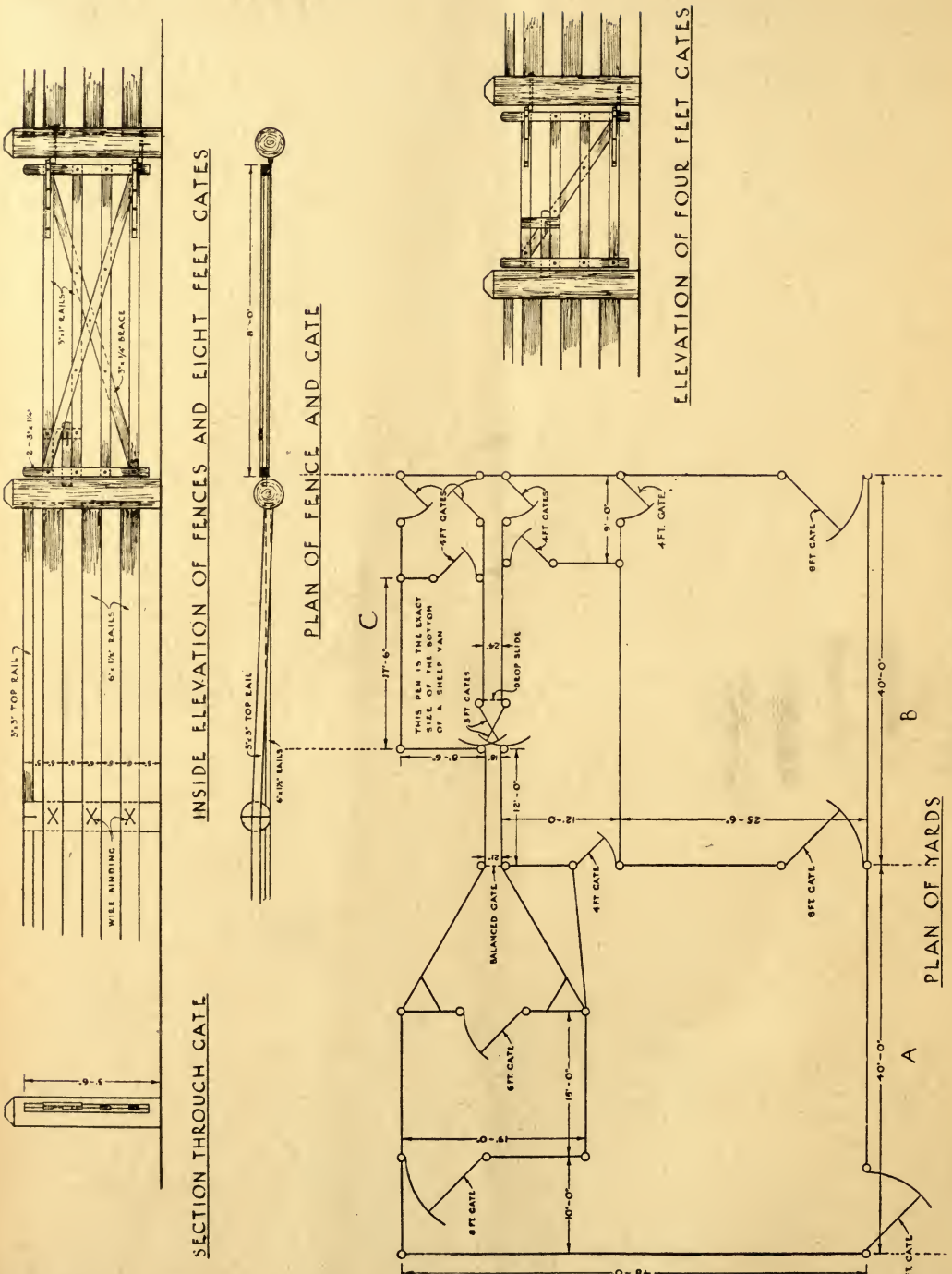
The approach to the drafting race should be arranged so the sheep can be forced gradually towards the race; these yards are termed forcing yards. Another yard which is of great value is a long, fairly narrow one which can be used for classing the flock.

Sheep work better uphill, so if the drafting yards are being built on a slope, the entrance should be at the bottom of the slope. Avoid sharp corners in yards, as sheep are likely to get jammed into the corner and smothered. Where corners are unavoidable they can be fenced across and a tree planted in the space enclosed.

When deciding on the position of a set of sheep yards, certain factors should be taken into consideration. They should be placed so that prevailing winds will not blow the dust towards the woolshed. The yards will probably be in constant use, so the question of dust is an important one. For



Bricked Drafting Yards.



Plan of Drafting Yards Suitable for Flock of 500 Sheep.

Co-operate with 2,000 other wool-growers !

The Commonwealth Wool Inquiry Committee, in 1932, stated "*that there are good and increasing facilities available for the centralized classing of small clips, and of mixed clips generally.* ***If these facilities were better-known, and the advantages of them better realised, the growers themselves would benefit.***"



The facilities recommended by the Wool Inquiry Committee are available under the Grazcos scheme. Here you see a section of one of the Grazcos stores where centralized classing is being carried out. The wool on the floor is being built up into big even lines of five bales or more. Every bin contains wool from many growers whose share is recorded on each bin sheet. Each lot of wool is weighed on the modern automatic machines.

CENTRALIZED CLASSING FOR FARMERS' CLIPS.

By having your wool classed and pooled into big, even lines you obtain a higher price for all your clip. Centralized classing of clips and pooling of wool oddments are done by Grazcos. Decide to-day, and consign your wool for classing to Grazcos, Sydney or Newcastle.

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this reason the yards would be better on gravelly than on loamy soil.

On one well-known stud property in this State every yard is paved with bricks. This is beyond the means of the ordinary flock owner, but it may be possible to have some of the yards in most frequent use (*i.e.*, the small forcing yard, race and classing race or yard) paved with rough concrete, stone slabs or even old railway sleepers. The accumulated dirt can then be swept or hosed off and the dust kept down.

If water is available it should be laid on to the yards, so that the main yards can be watered when in use. A certain amount of shade in the yards will be found of great value, especially when handling sheep during the summer months. If native trees can be left on the spot this should be done. Trees of the Wilga type are perhaps most suitable for sheep yards. Pepper trees make an excellent shade, though in the cool districts one of the deciduous trees would be of more value, as in winter no shade is required.

The Department can supply working plans of both small and large drafting yards at 2s. 6d. per plan.

Searching for Better Ways to Serve the Farmer.

Agricultural and Fruit Instructors Confer.

OUR caption—"Searching for Better Ways to Serve the Farmer"—aptly explains the idea behind the holding of conferences of agricultural and fruit instructors at Hawkesbury Agricultural College each year.

The field instructor is the main link between the Department and the farmer, and it is he who watches most closely and directs the application of scientific methods to practical farming problems, and it is the field instructor who determines from time to time what modifications of existing recommendations are necessary to meet changing conditions and circumstances.

For efficient team work and for the benefit of the farming community it is necessary that these officers should meet in conference to "compare notes," or, in other words, to ensure uniformity of advice and to check-up on the methods advocated by the Department.



Agricultural Instructors at Hawkesbury Agricultural College.

Spring-time Work in the Apiary.

W. A. GOODACRE, Senior Apiary Instructor.



Stimulative Feeding of Bees.

MANY beekeepers will find it necessary to feed their bees this spring so that the colonies will not be forced to economise by cutting down the brood rearing. The first economy practised by the bees when stores are getting low is to reduce the quantity of brood being raised. It is during the brood rearing in spring that we find stores disappear rapidly, and the apiarist who is prepared, particularly this season, to supply stimulating feed to keep the rearing of young bees in progress will be well repaid for the work. The past season was an off one for honey supplies from the fields, and many beekeepers found it necessary during the autumn to feed actual winter stores; in other cases, where the bees obtained some supplies from the fields, insufficient food was stored to see them over the cold weather and through the building up of a brood nest in the spring. Another point in favour of stimulation is that it keeps the colonies contented, and there is less likelihood of bees absconding from their hives.

The Comfort of the Colony.

It is very important to ensure that the bees are comfortable in their hives. Any surplus supers above the actual requirements of the cluster should be removed so that the heat created by the bees may be conserved. As is usual after an off season, quite a number of colonies will come through somewhat weak in population, and these will need particular care, and it may mean that a few of the combs in the brood chamber could be removed and a division board placed against the remaining combs to keep the small colony compact. For further comfort in such cases the space left on the removal of the combs could be filled in with bagging or such material.

With care, many of the small stocks should pull through. Some beekeepers prefer to unite the small colonies, but it is usually best, provided there are anything like sufficient bees, to give them a chance to exercise their own efforts. The queens may be valuable, and if the bees will hang on until the more progressive have built up to a populous state, it will be possible to assist them with some brood and bees. The brood given should be about at the emerging stage, and should be placed, with the adhering bees, in the brood nest of the weak hive. With the brood so well developed, the bees will not be overtaxed in their effort to incubate it.

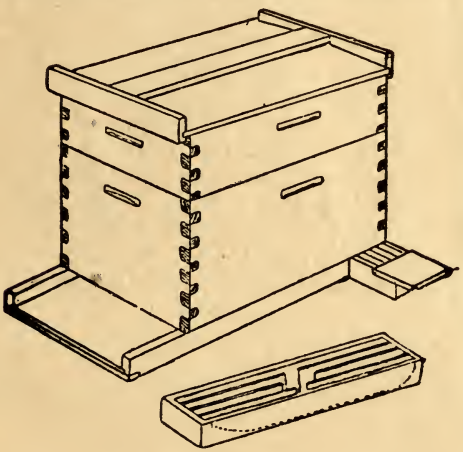
Method of Feeding.

Where winter stores have been on the light side it will be necessary to commence feeding as soon as the bees show some spring activity. It is best to feed inside the hive, or to use feeders of the Alexander or Boardman type, which serve the same purpose. From the accompanying illustration it will be seen how the Alexander feeder is fitted.

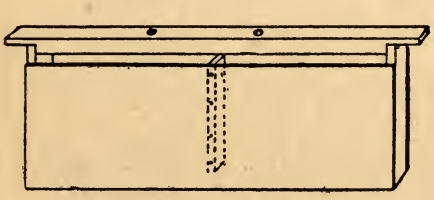
The Boardman type of feeder consists of an inverted jar fitted into a small box holder arrangement, on the open end of which are projecting lugs, which are pressed

into the hive entrance until the face of the feeder is flush with the hive body. The air pressure prevents the honey or syrup coming from the bottle faster than the bees consume it from inside the box. For the division board feeder it is necessary to provide space inside the hive by removing an empty comb from near the cluster of bees. The "Simplicity" type, for feeding small quantities, may be inserted in the hive, space being provided by removing a comb or two.

As an economical feeder many use tin containers such as preserved fruit tins or



The Alexander Type of Feeder.



Division Board Feeder.

suchlike, providing space inside the hive for them, or fitting an additional super to accommodate them where it is not convenient to remove combs below. To keep the colony warm when an additional super is fitted for feeding, packing may be placed over the frames occupied by the bees, just allowing convenient space for the bees to get to the food.

Class of Food to Supply.

Honey slightly thinned down with hot water may be used for stimulating purposes, but it should be made certain that the supply comes from an apiary free of disease. Candied honey, except for bottle feeders, is useful too, providing it is uniform in texture from the top of the container to well down it; candied honey is best liquefied (at about 65 deg. Fahr.) if there is any thin liquid matter on the surface, for this is a sign of yeast development or fementation. Sugar syrup made up of equal parts by volume of sugar and water is an excellent food, and does not induce the bees to rob, as is sometimes the case when honey, with its stronger aroma, is fed. The syrup should be well stirred, brought to boiling point, then allowed to cool down to lukewarm before feeding.

No other class of food for bees except the above mentioned is recommended.

Quantities of Food to be Supplied.

In cool climates, where changeable spring conditions occur, it is best to feed very small quantities for a start, as trouble may be met with in stimulating for heavy brood rearing early in the season should a real cold change give the bees a setback, and prevent them carrying on with the full incubation of the brood. The quantities of food given can be gradually increased as the spring advances. About a breakfast cup of honey or syrup per day is usually sufficient for a small colony on three to four combs (a "Simplicity" feeder holds about a cupful). For a populous colony for full stimulation a pint a day could be set out. In out-apiaries it is a troublesome business to feed every day, and it is found that where the larger feeders, such as the division board type or fruit tins, are employed, the supply of a larger quantity about twice a week gives good results.

It may be mentioned here that this stimulative feeding is different to the feeding of bees for winter supplies. In supplying food for winter the object is to get the full quantity of stores taken in by the bees as quickly as they can deal with it. The stimulation of brood rearing by the supply of small quantities over a longer period is not a good plan in the cold weather.

Stimulative feeding may be discontinued when the bees are securing sufficient from the fields.

When feeding in tin containers a number of pieces of wood long enough to extend just over the edge of the tin should be in-

serted; this prevents the bees from getting drowned, and allows of easy access to and from the food. The feeders in all cases should be filled indoors, kept covered while in transit to the hives, and placed in position as expeditiously as possible. Most experienced men feed their bees during any warm part of the day, but the beginner had better leave the work until the late afternoon to minimise excitement and any tendency to robbing.

Spring Dwindling.

As a result of the conditions during the past autumn and winter we may expect to find dwindling trouble in some apiaries during the spring. In coastal districts it may be the result of the bees having to deal with a deteriorated food supply, the deterioration being brought about by the excessively damp conditions that prevailed during some of the winter months, the honey in the hive away from the cluster of bees absorbing moisture and providing a ground for yeast development and fermentation. It is the aim of the bees at all times to endeavour to clear their food supply of any impurity, and as soon as they become active enough during spring they set to work on it, and in bad cases of deterioration stomach troubles result from the treatment or consumption of the stores.

In inland parts the trying times previously experienced may result in a natural dying off of the bees in excess of the number of young ones being raised. In any case of dwindling the lowered vitality of the bees may result in trouble, and intensified losses, from the parasite *Nosema apis,* which attacks the stomach of the bee.

The best form of treatment for dwindling is to make the colonies comfortable and give some feeds of sugar syrup in the way referred to previously. The stimulation, change of food, and comfortable conditions do much to raise the vitality of the bees—an important factor in overcoming disease. Any colony seriously affected with dwindling should be noted for re-queening as soon as possible. A young Italian queen from stocks that show immunity should be selected.

"Honey is said to be the oldest sweet known and was used centuries before sugar. It has been used extensively in cooking; and in the natural state is an excellent sweetening and avouring material. Research in cookery shows that honey adds flavour to all types of food, particularly salads, beverages and baker products. . . . Cakes and cookies made with honey may be very hard just after being baked, but when allowed to stand will become moist and mellow."

Chilled Beef and Fodder Conservation.

PROFESSOR R. D. WATT, Dean of the Faculty of Agriculture at the Sydney University, addressing delegates at the R.A.S. State-wide Fodder Conservation Conference held in Sydney last month, expressed the opinion that although they had solved the problem of landing Australian chilled beef abroad in an excellent condition, they were still only half-way to their goal.

To compete with countries like the Argentine, more attention would have to be given to the question of quality. The best quality chilled beef necessitated quick growth in the young, early-maturing animal. Fodder conservation and improved pastures were essential to achieve this, and in choosing the fodders to be conserved, due consideration had to be given to the purpose they were meant to serve.

Insect Pests and Their Control.

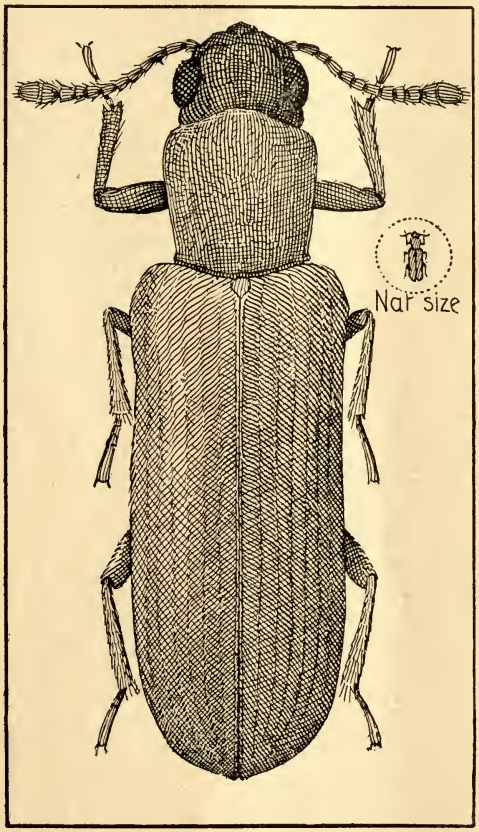
Notes Contributed by Officers of the Entomological Branch.

Wood Borers.

IN New South Wales two types of borers are principally concerned in the attack on seasoned timber used for buildings or furniture, viz., the powder-post beetle, *Lyctus brunneus,* and the furniture beetle, *Anobium punctatum.*

The powder-post beetle is narrow-bodied and varies from one-eighth to one-fifth of an inch in length and is dark-brown to reddish-brown in colour.

The furniture beetle is dark-brown in colour and varies from one-tenth to one-fifth of an inch in length. The prothorax is wide and overlaps the head like a hood, so that little, if any, of the head is visible from above.



The Powder-post Beetle (*Lyctus brunneus*).

The damage by the larvae or grubs of the powder-post beetle occurs mainly in hardwoods and some brushwoods and is invariably confined to the sapwood, while the furniture beetle confines its attack chiefly to white pine timbers and is never found in local hardwoods. In consequence it is most usually found in pine shelving, pine flooring and in kitchen furniture, or in more costly furniture where some pine has been used.

The tunnels of the larvae of the powder-post beetle run more or less parallel to the grain of the wood, while those of the furniture beetle are more irregular in direction, and the powdery excretion of the furniture beetle is much more coarse-grained than that of the powder-post beetle, and is not packed tightly in the tunnels as in the case of the lastmentioned beetle.

Shot-Hole or Pin-Hole Borers.

Beetles known as shot-hole or pin-hole borers belong to the genus *Xyleborus* and *Platypus* and attack wood in the green or semi-green state, but do not work in seasoned timber.

Sawn timber frequently shows pin-holes and shot-holes, as a result of the previous action of these borers, but no further appreciable damage can result from these beetles after the timber has been sawn.

Thus the habits of the beetles responsible for shot-holes or pin-holes are directly the reverse of those of the powder-post and furniture beetles, which only work in seasoned timber.

Life History of the Furniture and Powder-Post Beetles.

In essential features the life histories of the two beetles are very similar. The beetles commence to emerge from the timber during October and emergence continues until January or even later.

The characteristic small circular exit holes in the timber and the powder which falls from them are the first indications that the timber is infested.

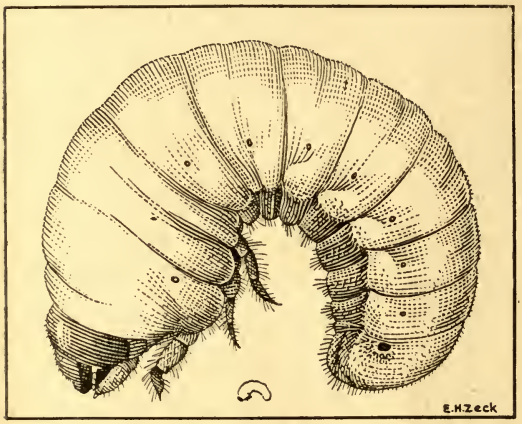
The insects mate and a few days later the females commence to lay their eggs in

pores, cracks and crevices in the wood, or even in the emergence tunnels.

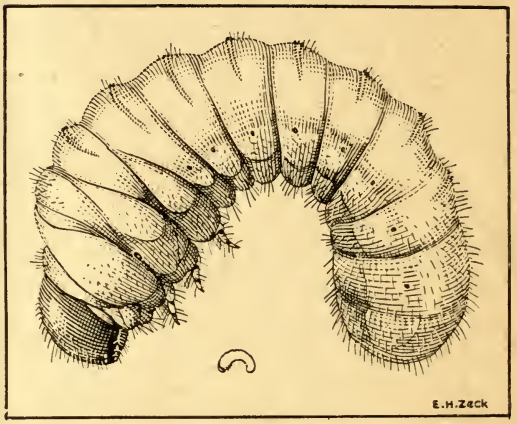
The eggs hatch and the very minute grubs eat their way into the timber, and remain as grubs, boring within the wood for a period of about ten months or more.

When fully grown the grubs change within their tunnels to pupae, and about three weeks later the adult beetles emerge.

On account of the small size of the eggs and newly-hatched grubs they are rarely seen, and there is no visible sign of where recently-hatched grubs have entered the timber.



Larva of Powder-post Beetle (*Lyctus brunneus*).



Larva of Furniture Beetle (*Anobium punctatum*).

Control.

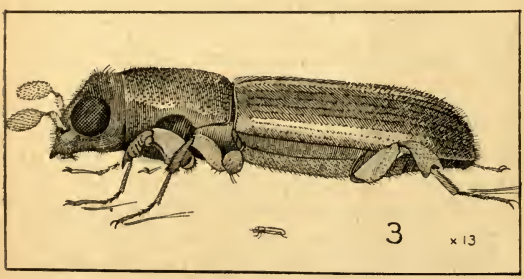
The treatment of the infested timber with creosote oil, either by brushing or spraying, is most satisfactory.

The oil should be first applied during late September or early October prior to the hatching of the adult beetles, and repeated treatments during the season may be necessary.

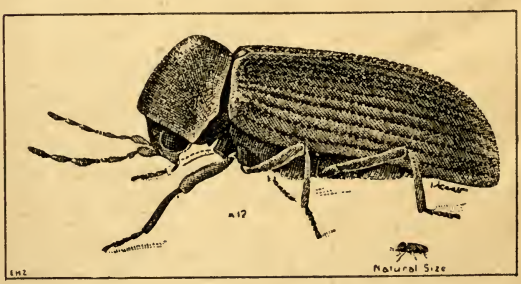
This treatment will prevent the beetles from laying their eggs and reinfesting the timber and will also kill any grubs, pupae or adults near the surface.

Where staining is not desirable, a mixture of nine fluid ounces of turpentine and one fluid ounce of kerosene is preferable. The addition of half an ounce of paradichloro benzene to the above solution will make the mixture more effective, as the paradichloro benzene is carried into the tunnels and acts as a fumigant as well as a deterrent. The turpentine and kerosene mixture is useful for furniture, and should be either brushed on, or, in the case of valuable pieces such as pianos, injected frequently, by means of a fine syringe, into the exit holes made by the adult beetles.

The application of heat to timber or portions of furniture is sometimes feasible, and if timber 1 inch in thickness is subjected to a temperature of 175 degrees Fah. for one hour all grubs, beetles and eggs will be destroyed.



The Shot-hole or Pin-hole Borer (*Platypus omnivorus*).



The Furniture Beetle (*Anobium punctatum*).

Other subtances such as benzene, carbon tetrachloride and the poisonous mercuric chloride, and also fumigation with various gases, may be resorted to at times, but great care must be exercised in the use of these chemicals.

Where timber is severely damaged replacement is preferable to the continued treatments necessary to ensure control.

Cockroaches (*Blattidae*).

Two species of cockroaches which sometimes become abundant in kitchens, pantries, bake-houses, cellars, etc., are the American cockroach (*Periplaneta americana*), and the German cockroach (*Blattella germanica*). The American cockroach, which is reddish-brown in colour, measures about 1½ inches in length; the other species is dark yellow to light brown in colour and measures about ¾ inch.

The habits of both species are very similar and their flattened bodies enable them to squeeze into cracks and crevices, behind skirting boards, etc., where they conceal themselves during the day. They come out at night to feed and are practically omnivorous, feeding on all kinds of foodstuffs, woollens, leather, book covers, etc., and where they occur in numbers impart a disagreeable "roachy" or foetid odour to shelves or articles they run over, in addition to tainting food.

The eggs are not laid singly, but are enclosed in a brown horny case or egg-capsule and are placed in two rows. The egg-capsule of the American cockroach contains up to fourteen eggs; that of the smaller German cockroach averages forty eggs. The egg-capsule is deposited in some dark corner or crevice, but the female may carry it, protruding from the tip of the abdomen for several weeks before selecting a suitable site.

The young stages have the same habits as the adults and live with them. They increase in size by a series of moults until the adult stage is reached, at which time the wings are fully developed. The life cycle of both the above species, from egg to adult, occupies about one year.

Control may be obtained by blowing any of the following substances into their haunts, with the aid of a small bulb insecticide duster:—

Boracic acid or boracic acid mixed with an equal quantity of either flour or powdered starch; powdered borax or borax mixed with chocolate; sodium fluoride or



Left: **Small German Cockroach** (*Blattella germanica*).
Right: **American Cockroach** (*peri planeta americana*).

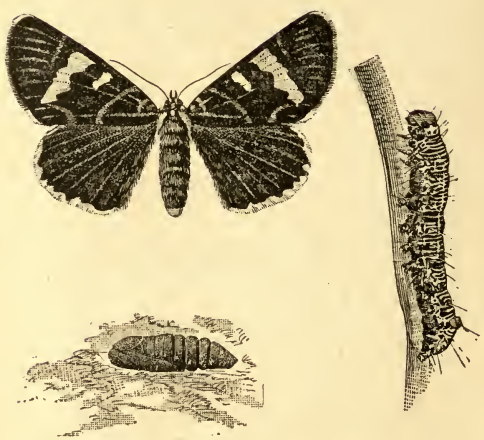
sodium fluoride mixed with pyrethrum powder at the rate of 1 part of pyrethrum to 3 parts of sodium fluoride.

Care should be taken, however, to keep the sodium fluoride away from foodstuffs as this substance is somewhat poisonous.

The removal and destruction of all waste food, together with the cleansing of all greasy surfaces, will eliminate sources of attraction to the cockroaches and assist in their control.

The Grape-vine Moth (*Phalaenoides glycine*).

The caterpillar of this moth is the most common pest of the grape vine, and frequently occurs in sufficient numbers to damage seriously the foliage and young bunches.



The Grape-vine Moth (*Phalaenoides glycine*).
Adult (top left). Pupa (bottom left). Larva (right).

The winter is passed in the ground in the pupal stage, and the moths, which measure about 2¼ inches across the outspread wings and are black with yellow markings, emerge in the spring about the time the vines come into leaf.

The female deposits her eggs upon the vines, and the larvae, which later emerge, are in general colour greenish-yellow marked with numerous short transverse and irregular black lines and measure about 2 inches in length when mature.

Control.—Thorough spraying of the vines with arsenate of lead, using 1 lb. arsenate of lead powder to 40 gallons of water, will control this pest. The spraying should be carried out in the spring, when the larvae first appear on the vines, and repeated if the caterpillars again become abundant later in the season. Where the arsenate of lead spray is necessary it may be combined with the fungicidal sprays.

Grasshoppers (*Chortoicetes terminifera*).

Land owners in the central and western districts of New South Wales are reminded that the overwintering eggs of the grasshoppers may commence to hatch during September, the exact time of their emergence being influenced by weather conditions. The young hoppers, on hatching from the egg-beds, spread outwards, and, feeding on the grass and herbage, move forward in long lines of many thousands or millions. These spring swarms of hoppers will grow gradually until after about six weeks they become winged.

Co-operation Necessary for Control.

The problem of control is a community one and should be taken up as such, as the best results can only be obtained when every landowner is on the lookout and is prepared to aid in combating the pest. With control measures universally adopted the grasshoppers should not be able to appear in seriously destructive numbers in any part of the State.

Control Measures.

For the control of grasshoppers, poisoning with arsenite of soda by (*a*) baiting or (*b*) spraying is recommended.

The best control is to be obtained by attacking the swarms of young hoppers during the first three or four weeks after they emerge from the ground and before they have become scattered.

The Poisoned Bait.

The formula of the poisoned bait recommended, is as follows:—

Arsenite of soda, ½lb.; or Paris green, ¾ to 1 lb.
Molasses, 4 lb.
Bran, 24 lb.
Water, 3 gallons.

Dissolve the arsenite of soda in hot water and allow the solution to cool; then add the molasses and mix until dissolved. This liquid is then added to the bran and mixed thoroughly to form a crumbly mash.

If Paris green is used, it should be mixed thoroughly with the bran while dry, and the mixture then made into a crumbly mash with the water in which the molasses has been dissolved. Arsenite of soda is recommended for preference, as it is cheaper and more toxic to the grasshoppers. Avoid mixing the bait with the hands, particularly if any cut or wound is present, as the poison may be absorbed.

The bait should be broadcast over the infested area or over a strip 30 to 50 feet wide in front of the advancing swarm at the rate of 20 to 30 lb. per acre. Care should be taken to scatter it in a finely-divided state and not in pellets or heaps. Hoppers are poisoned by this bait within twenty-eight to forty hours. The cost of materials for this bait is about 2s. to 2s. 6d. per acre actually treated.

The Poison Spray.

For pastures, the complete efficacy of arsenite of soda spray as a control for grasshoppers in the hopper stages has been demonstrated over a number of years. The formula recommended is:—

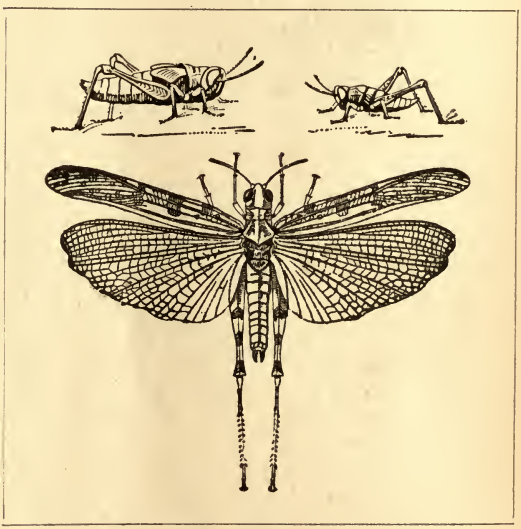
1 lb. arsenite of soda;
2 lb. of treacle or molasses (preferably molasses);
16 gallons of water.

Even without treacle or molasses, the spray is valuable for control.

Dissolve the arsenite of soda in some hot water in one vessel, and the molasses also in warm water in another vessel. Allow the two solutions to almost cool before mixing them together and diluting to the correct strength.

The spray should first be applied on a strip of grass about 30 to 50 feet wide immediately in front of the advancing hopper swarms, and then directly on to the swarms. The spray kills partly by caustic action, but mainly because the hoppers drink the liquid or feed on the poisoned grass. Spraying need only be light. About 75 to 80 gallons of spray per acre is quite sufficient—it is not necessary to waste material by drenching the grass, but merely to apply it in a fine mist. The cost for materials works out at about 4s. 6d. per acre. It has been proved by severe tests that the spray, made and applied as directed, is not harmful to sheep.

If this spray is used on a strip of crop to prevent its penetration by advancing hoppers, the sprayed portion should afterwards be cut and burnt; it must not be fed to stock.



Plague Locust (*Chortoicetes terminifera*).
Adult (*bottom*). Youngest stage of "hopper" (*top right*). Late stage of "hopper" with wing pads well developed (*top left*).

Sheep Blowflies.

Blowflies probably will soon be making their presence felt in many districts of the State. The intensity of the attack will depend largely on climatic conditions, but unless rather abnormally dry weather is experienced graziers who wish to avoid much hand-dressing and the losses of sheep associated with heavy strike, should be prepared to jet.

Calcium arsenite jetting fluid is the best mixture at present available. One jetting will make handling for crutch strike unnecessary for four weeks, and will definitely limit it for a further two weeks. In other words, one jetting, if done when strikes begin to appear, can, at a cost of about one-fifth of one penny per sheep for material, break the back of the normal spring blowfly attack.

Calcium arsenite is a fine white powder, insoluble in water, and made by boiling milk of lime with a solution of white arsenic in the presence of a little caustic soda as follows:—

Boil 4 lb. white arsenic and 7 oz. caustic soda in 2 gallons water in a petrol tin until the arsenic is apparently dissolved. In slightly less than 2 gallons of hot water in another petrol tin slake 4 lb. stone lime, putting in the lime a pound or so at a time and

stirring the water as slaking takes place. Pour the hot milk of lime slowly into the arsenic solution, which should be kept boiling quietly beside the fire. If the lime be added too rapidly the mixture will boil over. Keep boiling quietly for a further twenty minutes. The petrol tin of calcium arsenite and weak caustic soda is then made up to 40 gallons for use in jetting.

In Sydney white arsenic is obtainable at about 42s. per cwt., while caustic soda costs about 8d. per lb. in 14lb. tins. Stone lime is best obtained locally. It is purchased in sacks from the burners by lime merchants, and without additional protection from the air it will deteriorate ("air-slake") fairly rapidly. Only hard lumps should be used in the preparation of the spray mixture.

Arrangements can generally be made to purchase lumps only in quantities of less than 50 lb. at about 1d. per lb. and the lumps may readily be stored indefinitely in 4-gallon press-top tins such as those in which white arsenic is often sold (these tins hold about 30 lb. of stone lime) or in "mintie" tins, etc.

At these prices 100 gallons of jetting fluid, which is sufficient for about 400 sheep, will cost 5s. 3d. for materials alone. Freight charges will bring the cost of materials to about one-fifth of one penny per sheep per jetting.

Soap cannot be used with calcium arsenite, and the caustic soda is included instead to help the liquid to wet the wool.

As the calcium arsenite is in the form of fine insoluble particles suspended in the water it will settle to the bottom unless the jetter tank has some suitable agitator fitted in it.

In all experiments it has been shown that no jetting mixture will give absolute immunity from crutch strike for more than about two weeks. All arsenical jetting mixtures owe their value to the fact that they limit, very definitely, the spread of individual strikes. Calcium arsenite has proved superior in reducing very considerably the number of small strikes that do occur, and in making jetted sheep safe, from crutch strikes which require dressing, for four weeks, and in greatly reducing serious strikes for a further two weeks. Arsenite of soda will make handling unnecessary for about three weeks. Arsenical dips have proved better than arsenite of soda, but not so good as calcium arsenite. Jetting with insoluble arsenicals gives very good protection indeed to rams' heads, small strikes that may occur in wounds which have followed fighting being prevented from spreading into the surrounding wool.

Jetting, to be effective, must be done thoroughly, the wool surrounding the crutch being properly saturated. For sheep carrying two months' wool a pressure of 100 to 125 lb. per square inch is desirable, the jet being pointed upwards in the crutch.

Many types of hand-operated and power-driven jetting machines are on the market.

New Life for Old Cultivator Points.

OUR thanks are due to Mr. H. S. Middleton, of "Purlewah," Werris Creek, for the following hints on the renovation of old cultivator points. Mr. Middleton has tried out these suggestions with complete success and can therefore recommend them to fellow farmers with confidence:—

"Do not throw away your old cultivator points, for with a little attention they can be made as good as new again. Put them in the forge, heat to a nearly white heat, flatten out portion of the turned-up parts, and cut sides down to a V-shape. Then sharpen (by hammering) the cutting edges, like a wood-chisel, heat in the fire until a *slight* tinge of red appears in the steel, then immerse in sump oil for about half a minute and throw out to cool. This will give just the right temper—tough and hard. For very worn points, punch a new hole near one end, and they will be nearly as good as new.

"Make your own cultivator points from old discs; there is nothing better, and they will outlast two sets of bought ones."

AS AN ACT OF FAITH YOU TILL THE SOIL.

You have no doubt that it will yield you something, but as to the quantity or quality of such a yield you have no guarantee. But place your faith in Chateau Tanunda and you are assured of the best results attainable with Highest Quality and Full Measure.

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For further particulars write **NEPTUNE OIL COMPANY LIMITED, 365 Kent Street, SYDNEY,** and All States.



September in the Orchard.

C. G. SAVAGE AND R. J. BENTON.

Spring-time Jobs for the Citrus Grower.

DURING the last six months the rainfall in coastal districts has been above the average, while in inland areas, on the other hand, falls have only been sparse. The growth of weeds and cover crops in the first-mentioned areas has in consequence been rather prolific, and in the others somewhat retarded.



As the result of the weather conditions, particularly in coastal areas, the quality of the oranges produced in respect to size has been adversely affected in many localities. In other instances improved size has resulted. These apparent contradictions in sizing may appear obscure to many growers, and where they are observed in the same grove call for investigation.

In most cases it will probably be found that the question of satisfactory sizing of fruit is connected with the ability of the location to permit of thorough underground drainage of the trees. Small-sized fruit may be seen on drained land, but the drains may be too far apart to cope with frequent rainfall, or the soil may not be well supplied with organic matter and may perhaps be insufficiently sandy to allow ready percolation, thereby preventing the roots functioning in a desirable environment. No factor militating against the best results should be overlooked, and where trees are bearing plentifully, but the fruit is lacking in some desirable character, the cause should be seen to.

Cultivation.

The ploughing under of weeds and green crops will now probably have been completed and the preparation of a loose surface soil condition by cultivation perhaps have been commenced. A fairly coarse condition of the surface is preferable to a fine mulch. The character of the mulch will be determined mainly by the type of implement used. The importance of aeration for the hastening of the decomposition of incorporated organic matter, and the danger of compaction of the soil if the tilth is too fine, should be kept in mind. A pamphlet on the subject of orchard cultivation is obtainable free from the Department.

Marketing Late Valencias.

A heavy crop of this fruit is being produced in all districts. Whilst in some cases it is satisfactory in size, much of it is on the small side, mainly for the reasons already referred to.

The indications are that as the result of the fairly satisfactory returns last season, shipments for export will be greater than last year, especially to Great Britain. High prices cannot be anticipated, but prospects appear definitely brighter than for fruit distributed locally. Only the best fruit, of sizes ranging between 2¼ and 2⅞ inches in diameter, should be forwarded. Clippers should be sharp, and clipping done closely and square to the stem end, and the pack should be neat and firm.

Reworking Unsuitable Varieties.

Inferior types and unprofitable varieties should not be persisted with, and now is the most suitable period of the year to prepare for reworking such trees. Trees in a weak condition will not rework satisfactorily, and should be brought into a more thrifty state before the operation is attempted.

If the trees are aged reheading at once is advisable so that vigorous growths may be forced out into which buds may be inserted next autumn. During the few months following the reduction of the head a limited number of growths only should be permitted. The trunk and arms of the old tree should be protected by whitewash or other cover against sunburn.

Bark grafting may also be practised. In this form of grafting small twigs from the desired strain are prepared with a sloped cut and inserted directly into T or inverted L incisions made in the old bark on the limbs. These take most successfully when the sap is well up—October to December. In two or three weeks the majority should have "taken" and the old head is then removed.

Planting.

With the risk of severe frosts almost gone and milder days in sight, the work of planting citrus trees can be undertaken. On receipt of the young trees it is a good idea to grade them according to the diameters of the stems, planting the most backward trees in a row by themselves in order that they may be given additional attention as regards hand watering, shelter, etc.

Prior to planting cut off all the leaves. This will retard transpiration and consequently help the tree to become established more rapidly. After placing the young tree in the hole, spread out the main roots and partly fill in the soil, then give a watering, after which the rest of the soil can be filled in. Be sure to keep the bud union a few inches above the ground level, and protect the stem to within 6 inches of the head by wrapping with several folds of newspaper.

Pruning.

It is now the most suitable time to "lift up" any citrus trees which may have large fruit-bearing limbs too near the ground. Such limbs should be cut back to more vertical limbs, but care should be taken not to lift the limbs more than 9 to 12 inches from the ground. Strong-growing limbs in the centre of the tree should be suppressed and a watch kept to see that these undesirable limbs are not replaced by later growth. If so, these new shoots should be cut out before becoming too large.

Some thinning of limbs in Emperor mandarin trees growing in shallow soils is desirable, more particularly in trees likely to bear a heavy crop next season. This will ensure better size in fruit. The removal of dead and spent wood should also be undertaken now, or whenever opportunity offers.

Emperor mandarins have borne only moderate crops during the present season, and as they bear more heavily in alternate years, a heavy crop can be anticipated. Thinning out of wood, therefore, especially on trees previously unpruned, can be fairly severe.

Diseases.

Growers experiencing trouble from citrus scab, melanose, and exanthema should shortly begin making preparation for treating these diseases. Leaflets giving full details are available on application from the Department.



Washington Navel Re-worked on White Siletta. Two and a Half Years' Growth.

Heavy Penalty for Sale of Red Scale Infested Fruit.

THE Minister for Agriculture (Hon. Hugh Main, M.L.A.) wishes to stress the point that to sell citrus fruit infested with red scale is an offence under the provisions of the Plant Diseases Act, for which a penalty of £50 is provided. By a proclamation made under the provisions of that Act growers are required to destroy red scale, either by fumigation with hydrocyanic acid gas or by spraying with miscible oil and water.

The Minister regards the enforcement of this proclamation as essential in the interests of the industry, and he states that instances of non-compliance therewith, or of the sale of fruit infested with red scale, must, in future, be carefully considered, with a view of instituting proceedings for the offence.

Roasting the Australian Nut Kernel.

THE popularity of the Australian nut is assured. It is delicious when eaten fresh out of the shell, but with some types there is the difficulty of breaking the tough shell. We can, therefore, look forward to even greater popularity for this nut when the shelled kernels are more widely marketed, either fresh or roasted.

When roasting, the nuts must be fully matured if the best results are to be obtained. The kernels containing the highest oil content give a better flavoured product

than those with a low percentage of oil. The latter are liable to darken or char during the roasting process.

To determine which nuts are suitable for roasting, the specific gravity of the kernels is roughly tested. The dividing line is around a specific gravity of 1; kernels with a specific gravity of less than this have a higher oil content, and contain less sugar. The fresh flavour of the two types is quite distinct. Generally speaking, the smooth-shelled nut has more oil and less sugar than the rough shelled nut, and is a more desirable type to grow.

Some trees produce nuts that have bitter kernels. Care should be taken that these are not included in the nuts offered for sale.

The kernels are air-dried in the shell before the nuts are cracked; they are then dried at a temperature of 175 deg. Fahr. for four hours in an oven through which a fair draught of air is continually passing. The kernels are then roasted for forty-five minutes at a temperature of 270 deg. Fahr., and allowed to cool, and gum arabic (10 grammes to 100 c.c. water) is applied. Salt is sprinkled over the kernels, which are then finally dried for a short while at 150 deg. Fahr.

To cook the kernels in vegetable oils, first dry as described, and then cook in the vegetable oil for fifteen minutes at 280 deg. Fahr.

Compulsory Measures for the Control of Fruit Fly.

WITH the approach of warmer weather the fruit fly will enter upon its phase of maximum activity. With a view to protecting their fruit, growers are advised to take the fullest control measures against the ravages of the pest. Apart from the question of self-protection there is the wider question of preventing the propagation of the fly and the consequent infestation of surrounding orchards. The law, therefore, makes control measures compulsory under a penalty of £50, and this obligation is binding on all owners and occupiers of land in which fruit trees are growing.

These compulsory measures are—

(*a*) to collect all fallen fruit at least once in every three days and immediately to boil or burn all infested and all waste fruit, or place it in a pit with an insect-proof cover;

(*b*) at least once in every seven days during the five weeks preceding the harvesting or ripening, whichever is earlier, of any pome, stone, loquat, guava or persimmon fruits, spray the foliage with a poison spray, according to the prescribed formula;

As an alternative, traps may be used during the period of five weeks mentioned. The glass traps are readily procurable and must be kept baited with the prescribed lure.

(*c*) all mandarins and Seville oranges must be removed from the trees by 30th September. Loquats must also be removed by the prescribed date.

As already stated, all owners and occupiers are affected by the foregoing; these requirements should have careful attention as neglect may entail prosecution.

Any further information may be obtained from the Department of Agriculture, or the local fruit inspector.

An Eminent Doctor's Views on Canned Fruit.

FRUIT is as good when canned as when fresh and sound. The very fact that it is canned at all pre-supposes scrupulous excellence, since the least blemish at the moment of canning develops with amazing rapidity. Despite this decided facility for deterioration, the Australian pack, to quote a definite Imperial example, has for a very considerable time included not one single contaminated tin, although the export to this country is very considerable. The time which elapses between the plucking of the fruit and its enclosure in the can, as well as the simplicity of the few preparatory operations, make it impossible that the fruit should lose either in freshness or in quality. A comparison with the methods of handling and exposing fresh fruit yields its own emphatic conclusions, says Sir Arbuthnot Lane, according to *Australian Food Manufacture.*

Blackhead in Turkeys.

(Infectious Enterohepatitis).

W. J. B. Murphy, B.V.Sc., Veterinary Surgeon, Stock Branch.



The occurrence of so-called blackhead in turkeys has become the limiting factor in turkey raising in most parts of this country. The disease occurs universally wherever turkeys are kept and its presence has in no few cases caused the abandonment of this profitable enterprise owing to inability to rear birds to a marketable age.

Blackhead as a disease of turkeys has perhaps been in existence for as long as turkeys themselves, but domestication of this type of poultry is responsible for the epizootic form in which it is seen in our flocks to-day. Unfortunately, there are comparatively few straight-out turkey raising plants in this State; usually these birds are kept as a side-line to some other project. In consequence little attention is paid to their feeding and management, owners are ignorant of their requirements, and no attempt is made to handle them on an economic basis, all of which factors invite the trouble which sooner or later occurs. There is, however, a considerable demand for prime turkeys at a remunerative figure, and this should stimulate greater effort in their production on a commercial basis.

The Cause of Blackhead.

Blackhead is a contagious disease caused by an amoeboid organism (a protozoa) known as *Histomonas meleagridis*. The germs are taken into the body with food or water and ultimately reach the caeca or blind pouches which constitute the first part of the large intestines. In this part of the bowel there exists an intimate association between the blackhead organism and the caecal worm *Heterakis gallinae*. The caecal worm is normally a harmless parasite of the fowl, occurring, as its name would indicate, in the caeca or blind pouches. It is a thread-like worm averaging approximately half an inch in length and is readily found in the contents of the caeca of almost any fowl examined. When caecal worms invade the caeca of the turkey, which they readily do, serious damage to the mucous membranes of these organs results, and through the punctures and inflammatory areas caused by them, the blackhead organism enters and penetrates into the deeper tissues of the intestinal wall. In addition to multiplying and doing extensive damage in this location, the organisms invade the blood stream and are carried by the portal vein to the liver where they give rise to further pathological changes.

The caecal contents of affected turkeys are a seething mass of blackhead organisms, and so they are voided in enormous numbers in the droppings. Even birds which have survived an attack of blackhead continue to void the organisms in their droppings for the greater part, if not for the remainder of their lives. These are the "carriers" and perpetuators of the disease. It has been shown that a "carrier" (recovered) chicken may pass between 20 and 40 million germs daily.

How Blackhead is Spread.

The spread of the organism from bird to bird must now be considered. If the turkeys' food or water supply is contaminated by the freshly-voided droppings of an

affected or "carrier" bird, the transmission of the disease takes place immediately upon other susceptible birds ingesting such contaminated materials. The *Histomonas* organism, however, is very susceptible to adverse climatic conditions, and is readily killed by exposure to heat, cold, direct sunlight, etc. Unless deposited in warm, moist shaded places few will survive for longer than twenty-four hours outside the bird's body.

In the caeca of affected turkeys the blackhead organism invades the intestinal tract of the caecal worm. There is almost indisputable evidence that the blackhead organisms finally come to rest in the ova (eggs) of such worms. These are also voided in the droppings and being provided with a tough impervious "shell" they are extremely resistent to climatic conditions.

The worm ova and consequently the enclosed and protected blackhead organism may survive for extended periods outside the bird's body. When ultimately the worm ova are ingested by turkeys they hatch in the bird's intestines, giving forth the caecal worm larvae, and at the same time setting free the blackhead organisms. The obvious result is an outbreak of blackhead.

Birds Affected.

Although primarily a disease of young turkeys, fowls are also susceptible to this complaint. Turkey poults between the ages of two weeks and three months are most severely affected, and in these young birds mortality is high—up to or over 90 per cent., depending upon the conditions under which they are kept. With increasing age a greater resistance is shown, but even in mature birds the disease will occur and may be responsible for considerable losses.

In chickens the occurrence of blackhead is almost totally confined to birds between three and ten weeks of age, and the symptoms exhibited are very similar to those of Coccidiosis, except that the severe intestinal haemorrhage often seen in acute cases of the latter disease does not occur in uncomplicated cases of blackhead. Fortunately, there are only isolated instances of blackhead affecting chickens, and losses, as far as one can gather, are light. The occurrence of this disease in chickens is of chief interest in that affected birds recover more or less rapidly, and they remain "carriers" and so spreaders of the germ for an indefinite period. Further, fowls are the natural hosts for the caecal worm which it has been shown plays such a great part in the occurrence of blackhead in turkeys. They are thus doubly dangerous.

Symptoms.

Turkeys affected with blackhead are first noted to be listless and are seen to lag behind the rest of the flock. A drooping of the wings occurs, later becoming very marked, and accompanied by a yellowish or greenish diarrhoea, which soils the feathers around and below the vent. Occasionally blood clots may be seen in the voided material. The general appearance now is very dejected, the plumage is dull and ruffled, and as the disease progresses the bird refuses to eat. Very often the head and other unfeathered parts of the body become dark in colour (cyanosis) due to disturbances in the blood circulation. From this symptom, although it is not always present, the name "blackhead" has resulted.

Some birds may die in a few hours, but usually death takes place about two days after the onset of symptoms. Older birds may linger for a week or more and some eventually recover. These as stated before, remain "carriers" of the blackhead organism, serving but to spread the germ in their environment and thereby ensuring the reappearance of the disease in future times. When healthy poults are suddenly exposed to infection mortality usually commences ten to twelve days later.

Like many other diseases of poultry, blackhead tends to recur each year on the same holding, becoming progressively worse.

Post-mortem Appearances.

Pathological changes in clinical cases of blackhead are confined to the liver and to the caeca.

The primary lesions occur in the caeca, one or usually both being affected. It will be found on opening the abdominal cavity that the caeca present a swollen appearance and on pressure are easily ruptured. In some cases perforation has already occurred. When the caeca are opened along their entire length, in cases of blackhead the contents will be noted to be yellowish in colour and of a soft cheesy consistency, as opposed to the dark-coloured contents of

the healthy bird. The walls of the caeca are considerably thickened and their internal surfaces show marked acute inflammation. In places exfoliation or lifting of the mucous membrane may have occurred, giving an ulcerated appearance to the organ. The remaining part will be covered with a pseudo membranous necrotic exudate. As a result of the inflammatory changes, adhesions within the caeca may have taken place. Isolated inflammatory lesions may rarely be seen in other parts of the intestinal tract.

The secondary lesions of blackhead are to be found in the liver and consist of dirty yellowish circular areas seen on the surface of this organ, varying in size up to half an inch in diameter. These lesions are quite characteristic of the disease, and at first sight they appear to be more or less discolourations, although closer examination will show them to be slightly dimpled or depressed below the level of the surrounding healthy liver tissue. They are in fact areas of degenaration and necrosis produced by the *Histomonas* organisms which have invaded the liver by way of the blood stream from the caeca.

Differential Diagnosis.

Blackhead in turkeys must be differentiated from the following diseases:—

1. *Spirochaetosis or fowl-tick fever.*—Turkeys of all ages are affected and the fowl tick will be found in the roosting quarters. Characteristic liver and caecal changes are absent.

2. *Tuberculosis.*—When the liver is affected, hard cheesy nodules are present and the disease does not appear in epizootic form. Usually older birds are affected.

3. *Tapeworm infestations.*—If these parasites are responsible for mortality in turkeys they will be found in considerable numbers in the first 15 inches of the small intestine.

4. *Coccidiosis.*—This disease may occur concurrently with blackhead, but the same control measures are applicable to both. When uncomplicated, coccidiosis causes inflammatory lesions in the caeca and duodenum, frequently with marked haemorrhage into the former organs. Characteristic liver lesions are absent.

Preventive Measures.

The application of suitable measures for the prevention of blackhead is based upon a thorough knowledge of the habits and life cycle of the causal organism. Treatment of affected birds being unsatisfactory, the rigid practice of preventive measures must be resorted to and will give best results. Constant protection must be afforded to birds at the period of their growth when they are most susceptible to the disease, *i.e.*, from hatching till they "shoot the red."



Liver of a Turkey affected with Blackhead.

Firstly, it has been shown that fowls are gross carriers of the caecal worm and some of the blackhead organism. Therefore, fowls and turkeys must be kept strictly apart. Where possible the running of fowls and turkeys on the same property should be avoided. Do not run turkeys on ground which has carried fowls unless it has first been rested for a period of over twelve months.

As pointed out, adult turkeys which have in their younger stages survived an attack of blackhead remain carriers of the disease. Even those which have never had blackhead may be carriers of the caecal worm. For these reasons turkeys should never be allowed to hatch and rear their own young. This, of course, also applies to the use of broody hens. All hatching should be done in incubators and the poults reared in brooders. They fare quite well, even in

battery brooders, where they may be kept until ten weeks old, provided that ample green feed is given each day, together with 1 per cent. of cod liver oil in a well-balanced mash. When turned out of the brooders the poults should be placed on to pasture or into pens in which adult turkeys have not been kept during the preceding eighteen months. In fact certain pens should be set apart exclusively for the purpose of rearing the young birds and used for no other purpose. On account of their convenient size, one often sees brooder and rearing pens used between seasons as a hospital for sick birds. This practice cannot be too strongly condemned, particularly with regard to the incidence of blackhead.

Some Precautions.

Young and adult birds should be kept as widely apart as possible. At no stage should growing birds be overcrowded as this invites many troubles in addition to blackhead. Never run turkeys either young or old on damp or swampy areas as these are likely to become heavily infested with both caecal worm eggs and blackhead organisms.

Blackhead is spread in the droppings. It follows that particularly in the rearing stages the more frequently and thoroughly the droppings are cleaned up and the more effectively contamination of food and water with droppings is prevented, the less will be the likelihood of an outbreak of this diesase.

In U.S.A., where turkey-raising is well established, weekly rotations of growing birds from pen to pen has greatly reduced losses from blackhead. There is no reason why a similar scheme should not be instituted here. When rearing in small pens very good results will follow the replacement of the top 3 inches of soil with clean soil or sand at the commencement of each rearing season.

Growing poults respond well to a ration containing a high percentage of milk or milk powder. Such a ration, together with an adequate daily supply of fresh green feed, by building up the vigour and constitution of the young birds, greatly increases their disease-resisting powers. This factor should be taken full advantage of.

Whether in the fowl or turkey both caecal worm ova and blackhead organisms are voided in the droppings. It is therefore unwise to use poultry manure as a fertiliser on crops which are to act as a source of green feed for young turkeys. The caecal worm ova, being highly resistant to climatic conditions, may adhere to the foliage of the growing plants, and by this means be introduced into the brooder pens.

Every care should be taken that infective material (droppings) is not carried from the adult turkey runs into the brooder or rearing pens on the boots or adhering to various utensils. This is very prone to happen in wet weather, as one is dealing with organisms which are microscopic in size. Attention to such points, although they may seem trivial, is warranted.

Disinfection.

For the purpose of disinfecting brooder equipment, concrete floors, feeding and watering vessels, brooms, shovels, etc., 2 per cent. phenol (or similar disinfectant) in boiling water is recommended. Disinfectant alone will kill the blackhead organism, but in order to destroy the caecal worm eggs the solution must be used boiling.

At Hawkesbury Agricultural College, where the occurrence of blackhead was formerly an acute problem, success is now claimed in prevention by giving ipecacuanha wine in the drinking water at the rate of one dessertspoonful to the quart. On one day each week the birds are penned up and have access only to water so treated. Treatment commences when they are one week old and continues till they "shoot the red."

Other authorities recommend the use of powdered ipecacuanha, two teaspoonsful for every twenty birds, given in the mash twice a week, for birds between two weeks and three months of age. Then the amount is reduced to one teaspoonful every ten days till the birds are six months old.

In order to control to some extent the presence of the caecal worm, tobacco dust at the rate of 2 per cent. in the mash may be given each day from the time the birds are one week old till they reach maturity. This treatment may be combined with the use of ipecacuanha in either its liquid or powder form.

It is to be emphasised that the administration of drugs must be secondary to the application of the preventive measures outlined above.

One has stated that the blackhead organism enters the bird's system through wounds

in the mucous membrane of the caeca caused by the caecal worm. Recently a surgical operation has been introduced involving the removal of the caeca or their closure by ligature at the point where they leave the intestine. The object is to remove or close the organ which is first attacked by the blackhead organism. While some success has attended the practice of this operation, it is yet in its experimental stages. The technical features and cost involved would seem to bar its general application in the field.

Treatment.

In addition to suggested forms of treatment being of little value one doubts whether it is wise to attempt to treat affected birds. Recovered birds remain carriers and spreaders of the blackhead germ. Would it not be better to kill such birds immediately than to persevere and eventually succeed with curative measures, and in so doing lay the foundation for the recurrence of the disease in the next generation of young turkeys? If not destroyed affected turkeys should be disposed of as soon as possible. On no account should recovered birds be permitted to mingle with the remainder of the flock, or foul the ground on which other turkeys will run.

The administration of ten drops of ipecacuanha wine twice daily to affected birds has been practised at Hawkesbury Agricultural College with some success. More recently the intravenous injection of organic arsenic compounds (neosalvarsan, etc.) has been suggested abroad, but as yet too little is known of this form of treatment to warrant its recommendation here.

South Coast Dairy Farmers.

Grow and Feed More Maize Grain and Lucerne.

Dairy farmers on the near south coast are heading in the right direction in the matter of forage storage. Entries in the fodder conservation competitions this season constituted a record, and altogether Mr. R. N. Makin, Senior Agricultural Instructor, judged fifty-two entries. As a matter of fact, Mr. K. Colless. of Emu Plains, won the Royal Agricultural Society's championship prize, particulars in connection with which are published elsewhere in this issue.

The quality of the fodders was generally good and showed improvement compared with former years. The bulk of the reserves was silage, of which competitors held over 7,000 tons, stored in overhead silos, pits and trenches.

There is, however, room for improvement in the matter of lucerne growing for storage. Some progress has been made in recent years, but much more is possible. Further attention could also be given to the growing and feeding to dairy cattle of more maize grain.

The Department has available, free of charge, instructional leaflets on all these subjects—silos, lucerne, maize—so that farmers cannot justifiably claim that they "do not know how."

The Wheat Silos are for the Convenience of Farmers, Not Speculators.

Under the Wheat Act, 1927, the Wheat Commissioner has power to dispose of any wheat on hand in the silos after 15th October, and it is the Minister for Agriculture's intention that this power shall be exercised, as he is not prepared to see wheat growers forced into the position of being compelled to purchase bags at high prices when the elevator system has been provided for the purpose of saving them this heavy expenditure. At present the silos are being used, to a large extent, to store wheat from season to season for speculative purposes.



New Dairy Buildings.

Must Comply With the Dairies Supervision Act.

ALTHOUGH it is not possible to set out designs for dairy buildings that are suitable for all conditions, it is possible to indicate the essential items so that, with the modifications that may be necessary as the result of climatic influences in particular districts, milking sheds and bails, separator rooms, and milk and cream storage rooms may be constructed up to the standard required by the Dairies Supervision Act.

With a view to assisting dairymen in the set-out and construction of their dairy buildings to the best advantage, plans have been prepared by the Department of Agriculture, and these are set out in "The Dairy Manual," a copy of which should be in the hands of every dairy farmer; it may be obtained from the Department, price 1s. 1d. posted.



These Bails Comply with the Law.

Where dairy buildings are to be constructed by contract, it is desirable that the farmer should have inserted in the terms of the contract, a clause to the effect that the buildings are to be erected to the standards required under the Act mentioned.

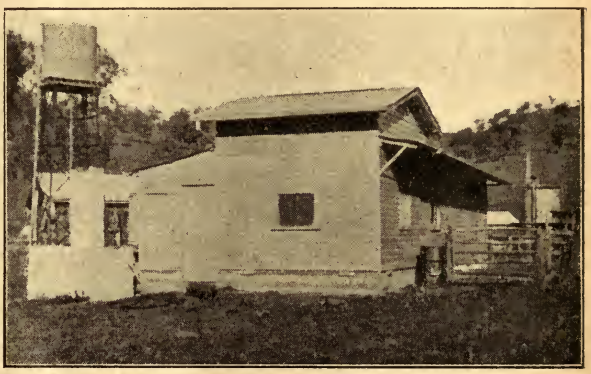
Milking sheds must occupy a well-drained position and must be situated not closer than 30 yards to a road, street or other thoroughfare. The walls must be of concrete, bricks, chamfer boards, fibro-cement, sawn slabs with cover strips, or other approved material, and must have a height of 7 feet. Concrete or brick walls must have the interior surfaces plastered smooth to a height of 4 feet and the weatherboard must be of well-seasoned hardwood and be painted with two coats of tar to a height of 4 feet, and

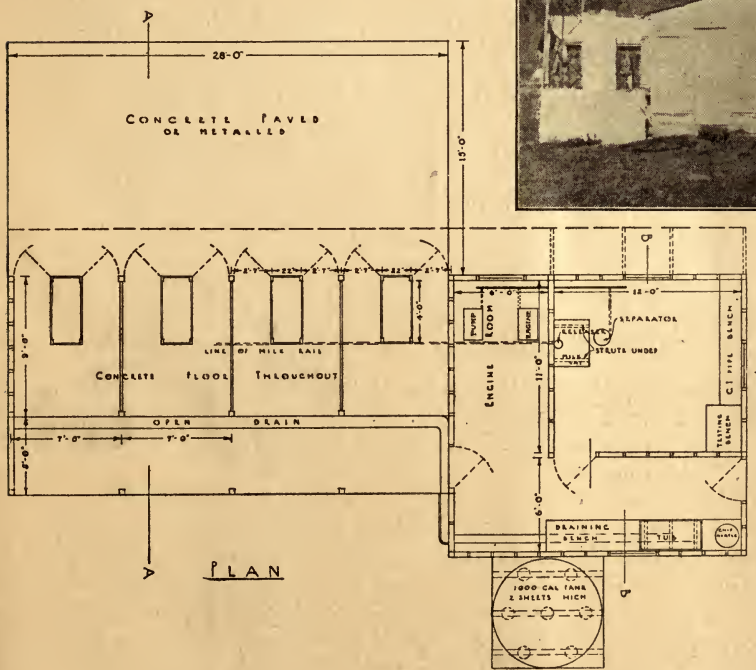
the surfaces of all wood walls, posts, etc., treated with two coats of approved limewash or painted with two coats of good oil paint.

All woodwork must be placed on dwarf concrete walls at least 1 foot above the level of the floor, and posts must be set on concrete blocks 6 inches above the level of the floor, the intersections of the walls and floor being rounded to avoid the accumulation of dirt at the angles.

dairy premises must include a small room for the storage of cream, situated at least 30 feet away from the separator room in order that fumes from the oil-driven machinery or any odours from the cow-yards may not affect the quality of the stored milk or cream.

The illustrations which accompany this note are of buildings recently constructed by Mr. J. A. L. Thompson, of Deepwater, South Gundagai, who is to be commended





Milking Machine and Bails with Separator Room Attached.

Above: New bails recently erected at Gundagai.

Left: The Department's plan for a building of this type.

The floor and drains must be of concrete at least 3 inches thick, cement rendered and graded at least 1 inch in 12 feet to the rear of the cows. The surface of the floor must be not less than 6 inches above ground level. An adequate supply of suitable water for washing the premises and utensils must be provided.

Where milking machines are used or where separating is done adjoining the bails, on the work and on his interest in modern methods of dairy farming. A number of the requirements of the Dairies Supervision Act, as set out in the "Dairy Manual," are clearly indicated in the photographs, and these may be of interest to other farmers who contemplate new dairy buildings. We are indebted to Mr. I. W. Scott, Senior Dairy Instructor, for the photographs from which the blocks were made.

Hot Weather Should Not Mean Second-grade Cream.

MANY dairy farmers fear the approach of summer. To all it perhaps means the necessity for a little more vigilance, but only to the careless farmer should it mean a falling off in cream quality.

Bacteria are much more active in the warmer months. The first step towards controlling the action of these bacteria in milk and cream is to prevent such organisms as have gained access to these products from multiplying to sufficient numbers to cause trouble. The only way to do this is to cool the milk or cream as much and as soon as possible. In a climate such as ours this is one of our biggest troubles.

In the absence of water being laid on to the separating room, any of the small water-bag coolers, to cool the cream straight from the separator or the milk immediately it is drawn, are very efficacious, as every degree of temperature we bring the product below 80 deg. Fahr. will have a retarding effect on the bacterial development, and in many cases (in relation to weed taints, etc.) the aeration will improve the flavour. If a cooler is not available a lot can be done by standing the milk or cream cans in cold water, or putting wet bags round them, but it must always be remembered that fresh water is advisable each day, and the bags should be changed each day and allowed to dry.

In the case of cream it should be stirred with a tinned metal stirrer two or three times each day, and not be mixed until each lot of cream is cool. Finally, it should be delivered to the factory daily, if possible.

With reference to the delivery of cream, many dairy farmers, after taking as much care as possible on the farm, allow the product to become heated in transit to the factory, either by not having a well-shaded stand or, when they do the carting themselves, by not taking the trouble to keep the cans covered (by, say, clean wet bags). This neglect may very often be fatal to quality.

Is the Spangenburg Process of Value to Dairy Farmers?

SOME time back much publicity was given to, and great things were predicted for, the Spangenburg process, by which it was claimed, among other things, that fodder crops could be grown to a useful length in ten days, thus making it possible to grow thirty-six crops in a year, as the process made the growing entirely independent of the seasons.

The Process Briefly Described.

Stated briefly, the process consists of sowing the seeds in trays in a closed cabinet from which light is excluded. The seeds are treated with considerable quantities of water containing a small proportion of a chemical. At the end of ten days each tray contains a closely packed growth of maize or whatever crop is sown. Maize, for instance, attains a height of 12 to 14 inches, and can be used immediately and the trays refilled and the process repeated. The crop is said to be young, succulent, and particularly suitable for the feeding of cattle.

The process takes its name from its inventor, Dr. P. Spangenburg, of Germany, and is covered by patent.

Process Investigated at Reading.

The Reading (England) National Institute for Research in Dairying investigated the process and its report is not altogether encouraging, as pointed out by Mr. H. C. Stening, Chief Instructor of Agriculture, at the recent conference of Agricultural Instructors.

The plant installed at Reading consisted of two galvanised metal cabinets of about 8 feet in height, each of which holds five trays of 43 square feet area. A charge of 77 to 110 lb. of maize is used per tray and this forms a layer some 1¼ inches deep. The bottom of each tray is perforated. On top of the cabinet there is a water storage tank, to which the necessary chemicals are added. The materials used at Reading were calcium, nitrate, sugar, and, it is thought, urea, at very low concentrations. A sys-

tem of pipes connects the storage tank with each tray, and allows the flooding of any tray with the nutrient solution, which can also be drained off the trays.

The seed used as Reading was maize, and at the end of ten days a thick growth of strong seedlings of 10 to 12 inches high was obtained. It is incorrect to call the material *green* food, since, owing to the absence of light during the growth period, no chlorophyll can be formed. The yield of fresh material is claimed to be 300 to 600 lb., and the whole contents of the tray (roots, seed and shoots) are fed and are eaten readily by cows.

Feeding Trial with Cows.

A feeding trial using four cows was carried out in which the maize fodder was compared with silage, and the rations were based on the composition of the original maize seed. One cow did slightly better on the maize fodder than on the silage, and with another cow the position was reversed. The remaining two cows did equally well on both rations. The trial was rather too short to be satisfactory, and it is intended to repeat it.

The growth of seeds *in the dark* can take place only at the expense of a *loss* of dry matter. The extent of this loss in the case of the Spangenburg process appears to be, with maize, about 30 per cent. That is to say, for every one hundred units of dry matter put into the cabinets as seed, only about seventy units are obtained in the sprouted product, the rest being water. It is only when plants grow *in light* that there can be any formation of new organic matter by photosynthesis.

The Reading Institute's report admits, however, that the nutritive value of a feeding stuff depends also on digestibility, protein content, mineral content and vitamin content, and states that if, in spite of the 30 per cent. loss of dry matter, there is a sufficient increase in these other values, it would still be possible for the process to result in a net gain in nutritive value.

An Uneconomical Process.

However, after investigating each of these factors, the opinion is expressed that the only obvious respect in which it is possible for the fodder produced by the Spangenburg process legitimately to claim a superiority over the ungerminated seed is in respect of vitamin content, and here the claim, though feasible, would need to be substantiated. In any case, the production of a vitamin food at the expense of a loss of 30 per cent. of the feeding units is extravagant. So far as results of feeding trials are available, it would seem that the Spangenburg product is comparable to reasonably good silage. Since this would not usually be valued at the figure of 30s. per ton, which is claimed for the cost of the Spangenburg product, this confirms the view that the latter is to be classed as uneconomic at least when other succulent foods of the type of silage can be made on the farm.

The product is better balanced for stock than are the cereal seeds from which it may be made, but this better balance is achieved by a *loss* of carbohydrates. A much more economical way of balancing cereals is to add a protein concentrate, such as oil cake.

It is possible that the process might be of some value for dairy herds or other stock in towns, or in arid regions, where such succulent foods cannot be grown. It may also be of special value as a vitamin rich *supplement* in the diet of stock. For none of these purposes is it considered to have any scope in this country.

Prevent That Falling-off in Production.

PROLIFIC natural growth of feed in anything like a good season has tended to entice farmers to adopt the Australian habit of gambling with the seasons, said the Hon. M. F. Bruxner, M.L.A., at the recent State-wide Fodder Conservation Conference promoted by the Royal Agricultural Society in Sydney.

In other countries not so well endowed by nature, he continued, farmers were compelled to make provision each year to carry stock through periods when natural feed

was not available. It was fortunate they had not to contend with those conditions in this country. On the other hand, however, there was no part of New South Wales that was not prone to drought and consequent loss of stock, or, at least, deterioration of the products of the livestock industry.

The dairying districts got a flush of growth in the spring and early summer, but often this growth died off in late summer and autumn and the herds went into the winter short of feed. Continuity of a supply of good fodders was essential in dairying districts.

Mr. Bruxner went on to quote the following figures:

	1924.	1925.	1926.
Cows in New South Wales	700,500	737,000	751,000
Butter made ... lb.	90,716,000	137,125,000	125,900,000
Average per cow lb.	127	190	169

These figures showed that. with practically the same cows, under good conditions the yield of butter per cow increased in one year by 63 lb., and fell off again the following year by 21 lb.

If cows could give 190 lb. in one year why not in any other year? asked Mr. Bruxner. Fodder conservation would prevent this falling off in production, and there was no section of the State where the storage of fodder could be more easily undertaken than on the coast.

Conserving Fodders on the North Coast.

IF fodder reserves are stored at a number of different points on the farm, not only is considerable time lost when feeding the cattle, but there is also the tendency to neglect to feed balanced mixtures of the stored feeding stuffs because of the inconvenience of location of one or more of the reserves. Every endeavour should therefore be made, says Mr. M. J. E. Squire, Agriculture Instructor, in reporting upon the North Coast fodder conservation competitions he judged this year, to store fodders as close to the place of feeding as possible.

In erecting haysheds, barns and silos, a general plan should be considered in conjunction with the layout of buildings already in existence and those likely to be erected in the future. The type of building most suitable to any particular district is also important, and before a farmer embarks on a building programme he would do well to examine the layout of buildings on other farms in his district and adopt the best features of each.

On the North Coast, owing to the heavy rainfall, protection of fodders to prevent deterioration requires more attention than where drier and less humid conditions obtain. Haysheds, for instance, should be closed in on at least the south and south-eastern sides as a protection against the heavily moisture-laden winds that come persistently from those quarters.

Again, it is very important to render the doors of overhead silos as nearly airtight as possible. Various methods of achieving this were adopted by competitors, the most effective being to hang a strip of material which is not affected by silage down the full length



A Worth-while Investment.
A concrete silo and feeding stalls.

of the silos inside and covering the doorways. Where each doorway was covered with a separate piece of material, the sinking of the silage tended to draw the covering below the doors, thus rendering it ineffective. One competitor filled the cracks with putty from the outside as well, and it appeared to be very satisfactory.

EVERY DAY

Can you remember a day on which you did not buy something? Actually, every day is a spending day, even if no money passes, because each day must bear its proportion of such running costs as rent, electric and gas service, wear and tear of clothing, and so on.

Everyone tries to earn as much as possible and to spend as little as possible when spending is necessary, and after all real thrift is usually practised in spending.

Surely a thought can be given to the other kind of thrift on at least one day a week—pay day—the kind of thrift which operates from a determination to put away at least a small sum that will NOT be spent.

Put the small sums in a Savings Bank Account to accumulate, to bear interest, and to be available when really needed.

Commonwealth Savings Bank • of • Australia.

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Nuclei Colonies, established on Three Hoffman or Four Bolton frames, with Tested or Untested Queen Bees in company, can be supplied from—

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With Tested Queens.. £1 17s. 0d. each.
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Tested 12/- „ „ „
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Owing to heavy demand and limited supplies immediate delivery cannot be guaranteed.

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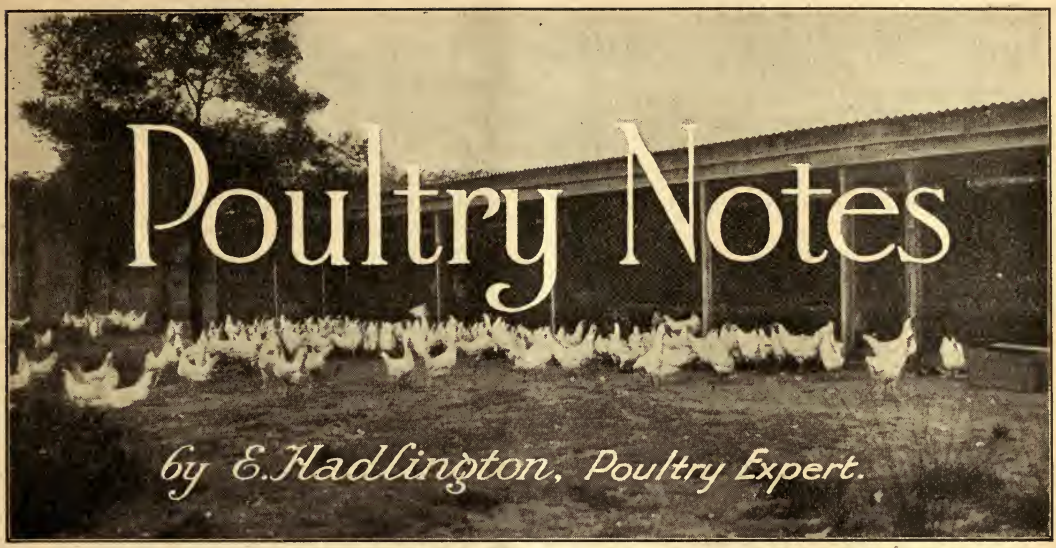
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Changeable Weather Affects Chickens.

THE wide variations in temperature usually experienced during September often cause trouble in the rearing of chickens. This is mainly due to the fact that with the advent of warm spring weather many poultry-farmers become rather careless and neglect to keep up the brooder temperatures, especially during the night, or perhaps in order to relieve some of the brooder work, they move the chickens out of the brooders a week or two earlier than they should, hoping that the warm weather will continue. Should a cold snap then occur the result is losses or a setback to the chickens. In other cases, where the brooder accommodation is overtaxed, sufficient ventilation may not be provided during warm evenings, thus causing stuffy and unhealthy conditions in the brooders, particularly where the chickens have no means of escape to a cooler zone.

Provide Adequate Ventilation.

Lack of fresh air is one of the commonest causes of chicken troubles at any time, but in the warmer weather it is absolutely essential that adequate ventilation be provided. At the same time, judgment must be exercised to regulate the temperature of the brooders when the early part of the evening is warm and then the weather turns cold later in the night.

These are the finer points in chicken-rearing which make all the difference between having strong healthy chickens late in the season, and the miserable "ne'er-do-wells" which are commonly seen at this time of the year.

Management of Chickens After the Brooder Stage.

Chickens should be taken from the brooders at six weeks old, and provided they have been well reared up to that stage, there should be no losses or unthriftiness from that time onwards, if they are handled under proper conditions. The first considerations are to prevent them packing together and to teach them to roost as soon as possible. It is surprising that on many farms primitive and makeshift methods are adopted in rearing the chickens after they leave the brooder, and the management during this stage of the chicken's life is often responsible for poor development and consequent lack of physique.

Small Houses are Most Suitable.

A mistake which is often made is to place large batches of chickens in open-fronted sheds without any means of preventing crowding together in corners. The result is that after a short time, even if losses do not occur, many chickens are seen practically bare of feathers, which is due to sweating.

The safest course is to have not more than about seventy-five chickens in each house, and for this reason small houses are most suitable for the purpose. The type of house found most satisfactory on the Government farms is one which is enclosed on all sides except for an aperture of about 12 inches along the top at the front, which is covered with wire-netting. The size of the house is 8 feet long, 6 feet wide, 6 feet high in the front and 5 feet at the back. An aperture is allowed the width of the rafters along the back, for ventilation. Ledge doors are fitted both back and front for convenience in attending the pens, and a number of these houses can be built in a continuous line, with runs at the front 30 to 40 feet long. The type of pens is shown in the accompanying illustration.

Teach the Chickens to Roost.

A method of teaching the chickens to roost and preventing them from packing together which has been found very satisfactory on the Government poultry farms was illustrated in these notes last year, but for the information of those who may not have seen it and to meet requests for information on this subject, the system is again illustrated herein.

As will be seen, the idea is to have two frames constructed of 2-in. by 1-in. Oregon, with rails of the same material spaced 4 inches apart, and 1-inch mesh wire-netting attached underneath. One frame is placed horizontally at the end of the compartment farthest from the door, and the other one at an angle so as to join up to the horizontal one, thus enabling the chickens to run up the sloping frame on to the level one, which they do quite readily after the first two or three nights. It is, of course, necessary to see that they go up at first.

REMINDERS FOR SEPTEMBER.

Hatching operations should be finalised as early as possible this month. Chickens hatched after the end of the month, unless given the best of conditions, will not be profitable.

Remove broody hens from the nests at the first sign of broodiness, and place them in crates with slatted bottoms. Remember that lack of attention to broodies means much loss of production during the spring and summer, and deductions for case eggs.

Now that the warmer weather is at hand, frequent inspections should be made of the perches and walls adjacent, also the nests, to ascertain if red mites are present. Neglect will soon result in a heavy infestation, with consequent loss of production.

Poultry keepers in country districts should also be on the alert for fowl tick. The occurrence of cases of diarrhoea among the fowls should be a warning that ticks may be present. For further information on the control of this pest, write to the Department for a separate leaflet.

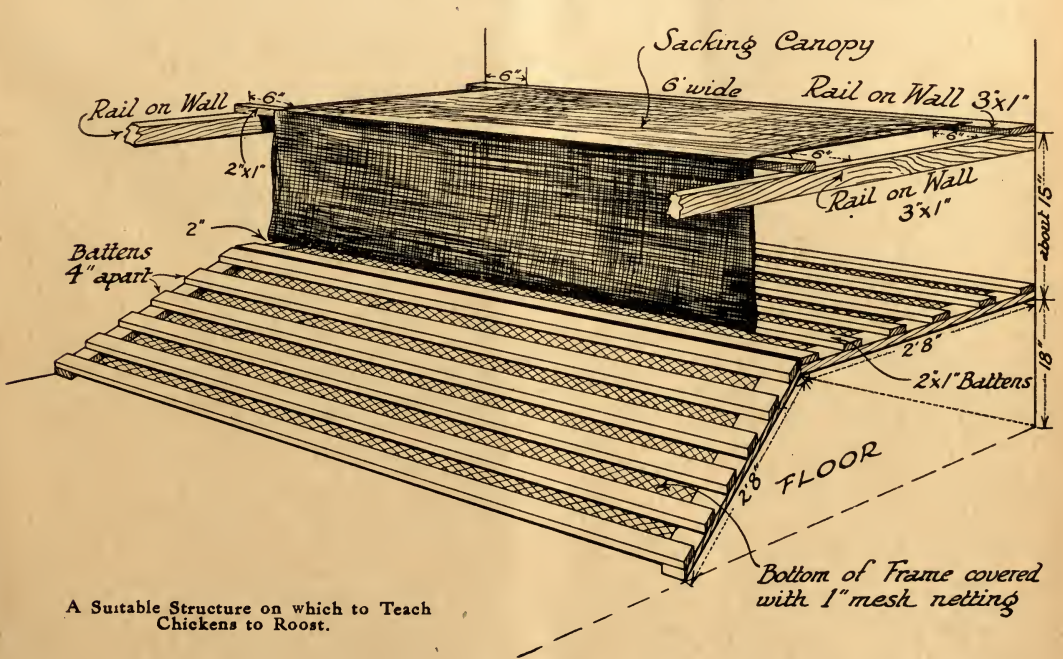
Keep an eye on the shell grit supply. It should be borne in mind that as egg production increases so does the consumption of shell grit, and lack of a suitable and adequate supply will soon cause a decline in production.

If the chickens have to be put out of the brooders earlier than usual or during very cold weather, it is advisable to have some means of making them cosy. A simple method of doing this is to place a bag canopy about 15 to 18 inches above the horizontal frame, and draping down to within an inch or so of the frame. A space should be allowed at both ends, for circulation of air and to provide light for the chickens to go underneath.

After about a week, the main perches running the full length of the compartment, may be placed in position and the chickens will gradually take to them. The frames can then be removed for use in another compartment, or the horizontal frame may be removed first and the other frame placed in a sloping position against the back wall with one side 6 to 9 inches from the floor, so that any chickens which have not taken to the main perches, will be kept off the floor.



Poultry Pens Suitable for the Second Stage of Rearing.



A Suitable Structure on which to Teach Chickens to Roost.

Reserve Stud Cockerels.

Where it is intended to retain cockerels for breeding purposes next season, the early-hatched birds should be reserved for this purpose, and at least three times the number actually required should be selected at first, so that there will be ample to choose from as they develop to maturity. In many cases the majority of the early-hatched cockerels are sent to market because good prices are usually obtained for these early birds. Thus, too few are kept from which to make a selection later on.

In choosing cockerels for stud purposes, the very early maturing birds should not be kept, as they do not develop the size and quality required to make good breeders. Many beginners make the mistake of selecting these precocious birds because they strut around and appear vigorous active birds, but it will be found that later on they cease to grow, and seldom develop into a desirable size, whereas the slower maturing larger-framed birds develop in size before reaching maturity.

Marketing the Early Cockerels.

Many poultry-farmers who commence hatching operations early in the season are tempted to send their early cockerels to market too soon, because good prices are usually the rule for grillers during September and October—the result is that they do not obtain the satisfactory prices that they would if the birds were kept two or three weeks longer. The added cost of feeding for the extra period would not amount to much, and the higher prices ruling for good birds would far more than cover it. During the spring, healthy birds weighing 3 to 4 lb. will always realise good prices, and the less the market is flooded with smaller birds the better will be the returns for good stuff. Later in the year it is necessary to keep the cockerels a month or so longer to secure payable prices.

The Rising Cost of Feeding.

The recent rise in the price of wheat is causing poultry farmers to look around for a means of cheapening the cost of feeding, and those who are feeding a large proportion of wheatmeal are now finding the cost much higher than pollard and bran. At the present time, the only commodity available which is cheaper than pollard and bran is rice pollard—the difficulty, however, is that only limited supplies are available. The price of rice pollard usually ranges between £1 and 30s. per ton lower than for wheaten pollard, and at this price, taking into account that its food value is somewhat lower than ordinary pollard, it would be a satisfactory substitute.

Rice Pollard May be Used.

Several tests of short duration have been carried out by the Department by using rice pollard to the exent of 50 per cent. of the morning mash, and these have indicated that little if any difference in egg production results. While these tests could not be regarded as conclusive, it would appear that it would be quite safe to use rice pollard to the extent of up to 50 per cent. of the morning mash. In using this quantity, however, it would be advisable to increase the quantity of meat meal by 1 per cent.

Pit silos are now to be found on many farms on the far south coast, where three years ago such a method of conserving fodders was a decided rarity. As a matter of fact some south coast farmers have now adopted the filling of a pit silo each year as a regular farm practice.

A large number of dairy farmers are still sceptical as to the efficiency of this method of storing fodder on the coast, but it is only a matter of time when all will agree that pitting silage is a cheap, satisfactory and safe means of storing fodders.

THE AGRICULTURAL BUREAU'S PAGE.

Improved Conditions for Rural Communities.

"Better Farming, Better Business and Better Friends," is the Bureau Slogan.

A MORE perfect setting for the Annual State Conference of the Agricultural Bureau, of which some details were given last month, could not be found than Hawkesbury Agricultural College, Richmond, for the whole institution is in itself an educational inspiration.

The very fact that the delegates are all housed together allows a concentration on the programme that would not under other circumstances be possible. It means, too, that—a session over—the delegates fraternise with each other instead of rushing off to their respective hotels or boarding-houses, as would be the case were the conference convened in any of our country towns or in Sydney. This makes possible such a useful extension of acquaintanceship that any person who attends and uses his or her opportunities, finds that he or she will henceforth have friends in all parts of the State, and connected with all of our various agricultural and allied industries.

The State Conference Programme.

The design behind the programme is indicated by the comparatively few motions that are submitted for discussion—it being the desire of the Advisory Council which convenes the conference to make the whole programme as educational as possible, and for this purpose, it is felt that addresses by distinguished people, whom the majority of the delegates could not otherwise meet or hear, are more broadening and enlightening than a discussion of motions. With respect to the motions, however, it is felt that a few well-chosen ones do give an opportunity for introducing to the delegates administrative officers of the various departments which may come under criticism in the motions, enabling them to get a clearer idea of the other fellow's point of view, and so tending to produce that better understanding which is vital in better administration.



Where the Annual Conference was Held. Hawkesbury Agricultural College, Richmond.

When finalising its programme the Council is always faced with a very long list of suggested motions for the business paper, and also with another very big list of suggested speakers, and uses its discretion as to which of each will be most likely to serve the ideals of the Bureau movement, which may be briefly summed up, "By better farming, by better business methods, by better friendships, by wider personal contacts, to enjoy a better and a fuller life."

With respect to the official programme, short, concise addresses are the order—most of them being limited to three-quarters of an hour, of which one-quarter of an hour is devoted to discussion of the matter dealt with.

A Day at the College.

The programme commences at 8.30 a.m. each morning, and carries on till luncheon time without a break, during which period, for each day of the conference, the delegates are divided into the following groups: Sheep and wheat, dairying, fruit and vegetable growing, and women's sessions. so that four sessions are running concurrently.

In the afternoon, sessions commence at 1 p.m. and carry on till 6 p.m., with an intermission at 4 p.m. for twenty minutes. At these sessions all of the delegates meet together, and the programme is devoted to matters calculated to be of interest to all men on the land, irrespective of the form of agriculture in which they may be engaged.

The evening sessions commence at 7 p.m. and carry on till about 10 p.m.; these also are general sessions. The idea behind the programme at night is educational entertainment—illustrated addresses, debates, travel talks, etc. At the 1934 conference "Banjo" Patterson entertained the delegates at one of the evening sessions; at the 1933 conference Ion Idriess was a speaker, it being the desire of the Council that the delegates should have an opportunity of meeting distinguished current writers.

The Social Side of the Conference.

At 10 p.m. those so inclined meet in the various common rooms or the "tuck shop," and a quite unofficial programme brings the delegates together for anecdotes, community singing, songs, recitations and all of the various items suggested by the proprietor of the tuck shop. Others call it a day at 10 p.m. and go to bed.

The final evening is devoted entirely to social matters, and the dance is a delightful finish to three days of concentrated work. The Memorial Hall at the College, itself a beautiful building, gay with coloured lamps and filled with happy men and women dancing to the strains of a perfect orchestra, leaves an impression on every mind.

Developing a Wide Outlook.

This programme is intended to be suggestive of activities which individual branches should undertake. It aims at developing a bigness of organisation by widening the general outlook.

The leaders of such organisations as the Royal Agricultural Society, the Farmers and Settlers' Association, the Primary Producers' Union, Fruitgrowers' Federation, Country Women's Association, and co-operative organisations, etc., are invited to deliver addresses—each selecting his own subject. Technical matters connected with production problems find their place in the special sessions and at the afternoon general sessions. The programme aims, too, at giving some idea of international matters, and it is customary to invite the Consuls-General of different countries to attend and discuss trade matters, whilst a fair proportion of the programme is devoted to marketing processes and economics generally.

On the day after the conference, parties are arranged to visit places of interest to agriculturalists, such, for example, as the abattoirs, terminal silos, etc.

Forthcoming District Bureau Conferences.

READERS of the "Agricultural Bureau's Page" should by now be acquainted with the objects of district conferences. Three such gatherings are to be held in the near future—Tamworth district branches at Attunga on 5th September, Illawarra branches at Penrose on 28th and 29th September, and Upper North Coast branches at Mt. George on 3rd and 4th October. A cordial invitation to attend is extended to all, members and non-members alike.

Tubercle-free Herds.

THE following herds have been declared free of tuberculosis in accordance with the requirements of the scheme of certifying herds tubercle-free, and, unless otherwise declared, this certification remains in force until the date shown in respect of each herd :—

Owner and Address.	Number tested.	Expiry Date.
		1934.
Limond Bros., Morisset	38	1 Sept.
Navua Ltd., Grose Wold, via Richmond (Jerseys)	29	2 ,,
Berry Training Farm, Berry	145	13 ,,
A. A. Campbell, Breadalbane, Mullumbimby (Guernseys)	52	16 ,,
William Thompson Masonic School, Baulkham Hills	38	20 ,,
H. W. Burton Bradley, Sherwood Farm, Moorland (Jerseys)	66	20 ,,
E. C. Nicholson, Jillamatong, Corowa ...	137	20 ,,
St. Patrick's College, Goulburn	8	21 ,,
C. Wilton, Muswellbrook	92	21 ,,
F. C. Harcombe, Hillcrest Farm, Warialda-road, Inverell	13	27 ,,
J. B. Burtenshaw, ' Sunnyside," Inverell ...	42	27 ,,
Wagga Experiment Farm (Jerseys)	65	25 Oct.
G. Powell and Sons, " Loch Lomond," Armidale	22	28 ,,
H. H. Hinton, Holbrook	13	9 Nov.
Riverstone Meat Co., Riverstone Meat Works, Riverstone	92	9 ,,
Wolaroi College, Orange	11	10 ,,
J. L. W. Barton, Wallerawang	16	17 ,,
Lunacy Department, Parramatta Mental Hospital	17	25 ,,
W. E. J. Goodwin, Wybong-road, Muswellbrook	46	29 ,,
E. W. Flower, Binna Burra	59	29 ,,
W. W. Martin, " Narooma," Urana-road, Wagga...	119	13 Dec.
St. Patrick's Orphanage, Armidale	15	14 ,,
Stace Bros., Taylor-street, Armidale	30	14 ,,
		1935.
Wollongbar Experiment Farm, Lismore (Guernseys)	123	11 Jan.
W. J. Hammond, Bellingen	96	12 ,,
Lunacy Department, Gladesville Mental Hospital	25	15 ,,
George Rose, Aylmerton	2	21 ,,
Mittagong Farm Homes...	36	22 ,,
Newington State Hospital and Home ...	98	24 ,,
Government Agricultural Training Farm, Scheyville	123	31 ,,
R. C. Dixon, Elwatan, Castle Hill (Jerseys) ...	19	22 Feb.
Lidcombe State Hospital and Home	151	22 ,,
T. H. Maples, Racecourse Farm, Bega ...	48	1 Mar.
Chapman Bros., Farm 166, Stoney Point, Leeton...	55	8 ,,
G. H. Hooper, Oak Hill, Bethungra	13	11 ,,
F. C. Butler, Yarranung, Bega	139	14 ,,
G. V. Ralston, " Porphyry," Seaham ...	118	15 ,,
J. Davies, Puen Buen, Scone (Jerseys) ...	231	22 ,,
P. M. Burtenshaw, Killean, Inverell	63	28 ,,

Owner and Address.	Number tested.	Expiry Date.
		1935.
J. P. McQuillan, Bethungra Hotel, Bethungra	25	4 April
W. Newcomb, " Minnamurra," Inverell ...	85	6 ,,
New England Girl's Grammar School, Armidale	32	18 ,,
Lunacy Department, Kenmore Mental Hospital	84	4 May
St. Michael's Novitiate, Goulburn	4	4 ,,
A. L. Logue, Thornbro, Muswellbrook ...	60	10 ,,
Rydalmere Mental Hospital	65	11 ,,
Forster & Sons, Abington, Armidale	247	31 ,,
W. J. Miller, 199 Mann-street, Armidale ...	8	13 June
St. John's College, Woodlawn, Lismore ...	36	29 ,,
St. Joseph's Convent, Reynold-street, Goulburn	3	12 ,,
St. John's Boys' Orphanage, Goulburn ...	24	12 ,,
A. D. Frater, " Fairview Dairy," Inverell ...	58	17 ,,
W. S. Turnbull, Flanders Avenue, Muswellbrook	37	27 July
Australian Missionary College, Cooranbong ...	62	19 Aug.
E. P. Perry, Nundorah, Parkville (Guernseys)...	25	13 Sept.
James McCormack, Tumut	81	28 ,,
E. E. McMullen, Springnook, Holbrook ...	37	0 Nov.
C. Maynard, Holbrook	12	9 ,,
E. S. Cameron, Big Plain, Narrandera ...	39	21 ,,
Lunacy Department, Callan Park Mental Hospital	30	30 ,,
A. Shaw, " Ardshiel," Craven Creek, Barrington (Milking Shorthorns)	141	6 Dec.
Department of Education, Gosford Farm Homes...	31	13 ,,
Department of Education, Brush Farm, Eastwood	11	20 ,,
		1936.
Lunacy Department, Morisset Mental Hospital	43	18 Jan.
New England Experiment Farm, Glen Innes (Jerseys)	29	24 ,,
C. J. Parbery, Allawah, Bega	105	31 ,,
J. F. Chaffey, Glen Innes (Ayrshires)	69	31 ,,
A. B. Finney, Fox Ground, Gerringong ...	35	8 Mar.
Department of Education, Yanco Agricultural High School	46	8 ,,
Riverina Welfare Farm, Yanco	108	8 ,,
Bathurst Experiment Farm (Ayrshires) ...	13	15 April
Cowra Experiment Farm	34	25 ,,
H. F. White, Bald Blair, Guyra (Aberdeen Angus)	352	7 June
G. L. Genge, " Easton," Armidale	42	13 ,,
Hawkesbury Agricultural College, Richmond (Jerseys)	121	14 ,,
Parker Bros., Hampton Court Dairy, Inverell...	93	30 ,,
Miss N. C. Brennan, Arrankamp, Bowral ...	18	3 July
Koyong School, Moss Vale	2	4 ,,
Tudor House School, Moss Vale	21	4 ,,
W. K. Frizell, Rosenstein Dairy, Inverell ...	66	10 ,,
Hurlstone Agricultural High School, Glenfield	54	19 ,,

Tubercle-free Areas.

The following Areas have been declared tubercle-free and no cattle are allowed to be kept therein unless subjected to the tuberculin test and found free from tuberculosis :—

Bombala Area.

Inverell Area.

Municipality of Muswellbrook.

Municipality of Queanbeyan.

—MAX HENRY, Chief Veterinary Surgeon.

Abortion-free Herds.

THE following herds have been declared free of contagious abortion (Bang's disease) in accordance with the requirements of the scheme of certifying herds abortion free :—

Owner and Address.	Number in herd.
Bawtree, B. F. W., Ben Lomond	22
Bush, W., Ben Lomond	32
Caldclough, A. E., "Dunelm," Ben Lomond ...	32
Cann, H. J., The Gap, Alstonville	...
Douglas, L. M., Ben Lomond	19
East, N. A. L., East Valley, Gum Flat, via Inverell	51
Hawk, J. T., Ben Lomond	42
Henderson and Son, Upper Wantagong, Holbrook ...	95
King, H. S., Glenroy, Llangothlin	43
McSweeney, W. J., "The Rivers," Canowindra (Jerseys)	69
Martin Bros., "Narooma," Urana-road, Wagga Wagga	86
Mott, T., Main Arm, Mullumbimby	26
Murray, A. W., Oakwood, via Inverell	17
Ralston, G. V., "Porphyry," Seaham	76
Rydalmere Mental Hospital, Rydalmere	63
Sams, C. R., Wilson's Creek, Mullumbimby	34
Sigley, A., Wilson's Creek, Mullumbimby	29
Smith, Jas. C., Ben Lomond	43
Walker, Jas. R., "Strathdoon," Wolseley Park ...	32
White, F. J. and Sons, Bald Blair, Guyra	238
Williams. Chas., Ben Lomond	41

—MAX HENRY, Chief Veterinary Surgeon.

Infectious Diseases Reported in July.

The following outbreaks of the more important infectious diseases were reported during the month of July, 1934 :—

Anthrax	1
Blackleg	7
Piroplasmosis (tick fever)	Nil.
Pleuro-pneumonia contagiosa	1
Swine fever	Nil.
Contagious pneumonia	1
Necrotic enteritis	Nil.

—MAX HENRY, Chief Veterinary Surgeon.

Agricultural Societies' Shows.

SECRETARIES are invited to forward for insertion in this list dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Box 36A, G.P.O., Sydney, not later than the 15th of the month previous to issue. Alterations of dates should be notified at once.

1934.

Forbes (F. N. Sykes)	Sept. 4, 5
Murrumburrah	,, 4, 5
Ungarie	,, 5
Deniliquin (P. Fagan)	,, 5
Boorowa	,, 6, 7
Albury	,, 11, 12
Cowra	,, 11, 12
Barmedman	,, 11, 12
West Wyalong	,, 15
Canowindra	,, 18, 19
Temora	,, 18, 19, 20
Singleton (J. T. McMahon)	,, 19, 20, 21
Gosford (E. H. Ironmonger)	,, 20, 21, 22
Corowa (H. G. Norton)	,, 21, 22
Barellen	,, 26
Quandialla	Sept. 26
Berrigan (R. Wardrop)	,, 27
Hillston	,, 26, 27
Narrandera (J. D. Newth)	Oct. 2, 3
Hay	,, 2, 3
Bribbaree	,, 3
Ardlethan	,, 3
Walbundrie (H. G. Collins)	,, 4
Leeton (E. C. Tweedie)	,, 9, 10
Ariah Park	,, 10
Millthorpe (A. R. Green)	,, 16, 17
Griffith	,, 16, 17
Cootamundra	,, 23, 24
Murwillumbah (J. L. Banner)	Nov. 21, 22
Lismore (H. Pritchard)	,, 27, 28, 29

1935.

Braidwood (H. E. Roberts)	Mar. 6, 7
Moss Vale (H. Richardson)	,, 7, 8, 9
Kempsey (E. Mitchell)	Mar. 27 to 30

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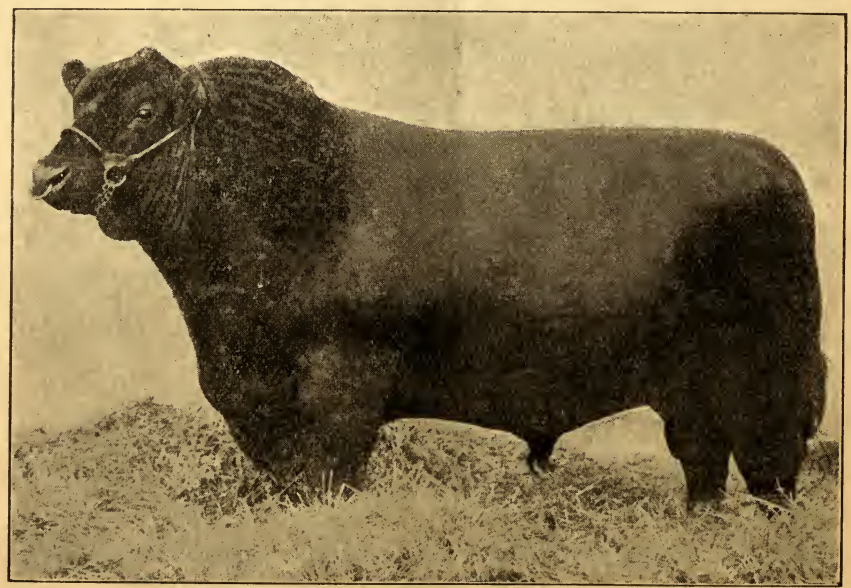
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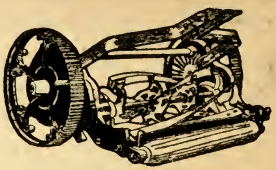
(*See opposite page.*)

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The "Centenary" Senior Lawn Mower is a machine specially made for Nock & Kirby Ltd., by the Pennsylvania Lawn Mower Co., to suit Australian conditions. 10-in. solid style wheel, 5 hardened steel blades, 5½-in. diameter cylinder, self adjusting ball-bearings, Spring Steel lower blade. Size 14-in.

Nock & Kirby's Price..... 75/-

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Write for leaflet. If you send us a rough layout of any proposed water scheme we will forward you an approximate quotation and any corrections to cut down the price.

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contains a high percentage of calcium and phosphoric acid in the most assimilable form.

Analysis by Cooksey Newman & Co., Public Analysts, Sydney:—
"CALCIUM 31%, PHOSPHORIC ACID 29%.
100% SOLUBLE IN PROCESS OF DIGESTION."

KEEP YOUR SHEEP HEALTHY and produce to full capacity.

VIC LIC prepared in Concentrated and Ready-mixed forms.
Concentrated, £25 per ton. Ready mixed, £10/10/- per ton.

5 BAGS CONCENTRATED and 10 of Salt makes Ton of Lick.

TETRALENE DRENCH FOR WORMS AND FLUKE
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WILMOLENE DRENCH for stomach and intestinal worms
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LITTLE'S SHEEP DIPS.

LITTLE'S POWDER for easy mixing. No harsh effect on the fleece.

LITTLE'S FLUID—the "original" fluid, made since 1876.

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MAMMITIS is costing Australian farmers over £1,000,000 every year in loss of milk and butter-fat.

MAMMITIS ruins good cows, renders milk unfit for use, cuts down income, and causes trouble in the manufacture of dairy produce.

All sorts of remedies and schemes are being put up to farmers for the treatment of Mammitis.

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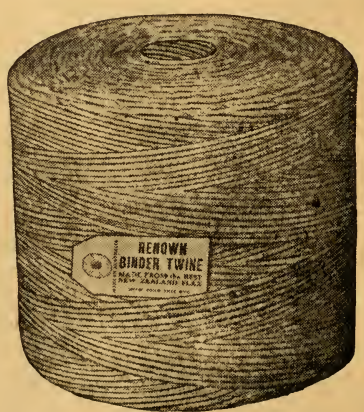
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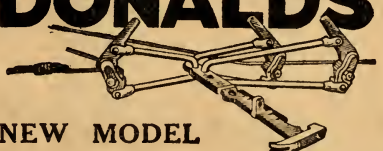
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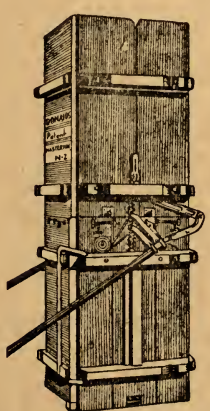
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Attunga	Culcairn	Grong Grong	Narrabri	Urana
Baan Baa	Cullivel	Gunnedah	Narromine	Urangeline
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Berrigan	Dubbo	Inverell	Parkes	Wattamondara
Billimari	Duri	Kadungle	Peak Hill	Weedallion
Biniguy	Emerald Hill	Kamarah	Pleasant Hills.	Weethalle
Binya	Erigolia	Kikoira	Pucawan	Weja
Bogan Gate	Eugowra	Ladysmith	Quandary	Wellington
Boggabri	Eumungerie	Laka Cargelligo	Quandialla	Westdale
Boorowa	Ferndale	Lockhart	Quirindi	W. Tamworth
Boree Creek	Finley	Maimuru	Rand	Wirrinya
Breeza	Forbes	Mangoplah	Reefton	Woodstock
Bribbaree	Ganmain	Manildra	Shepherds	Wyalong
Brocklesby	Garema	Manilla	Stockinbingal	Wyanga
Brundah	Geurie	Marinna	Tallimba	Yarrabandai
Brushwood	Gidginbung	Marrar	Temora	Yeoval
Buddigower	Gidley	Matong	The Rock	Yerong Creek
Burgooney	Gilgandra	Mickibri	The Troffs	Yiddah
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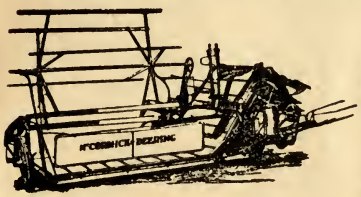
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G. A. H. HOLBOROW,
Wheat Commissioner and
Manager, Govt. Grain Elevators

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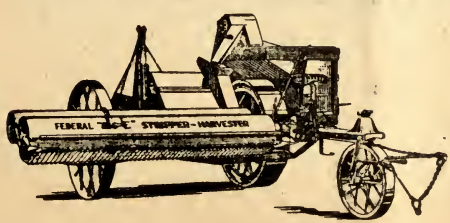
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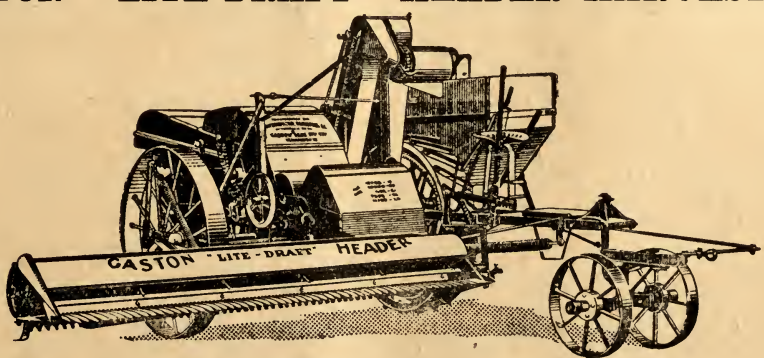
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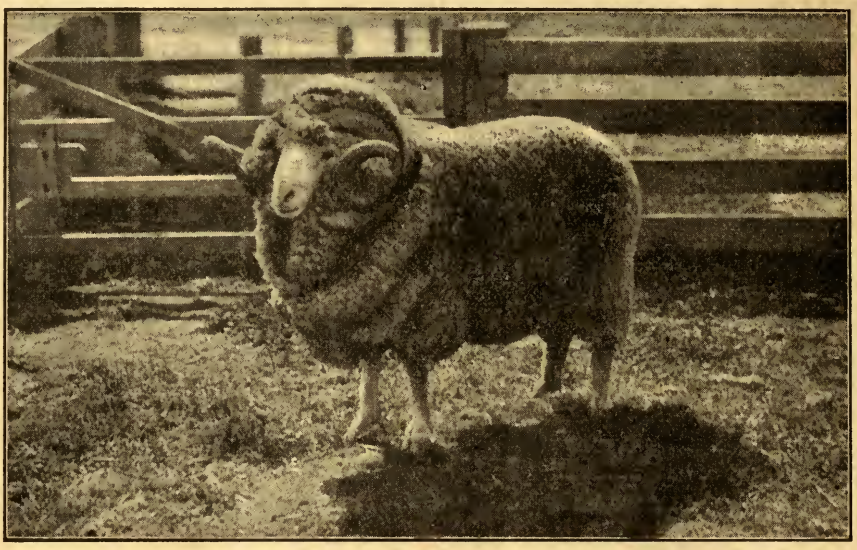
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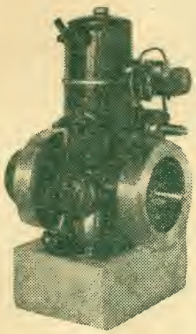
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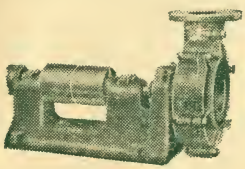
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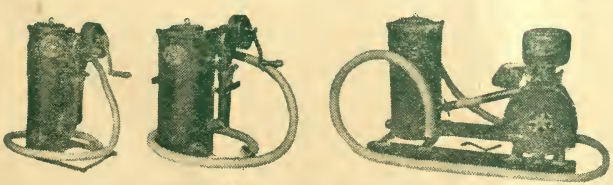


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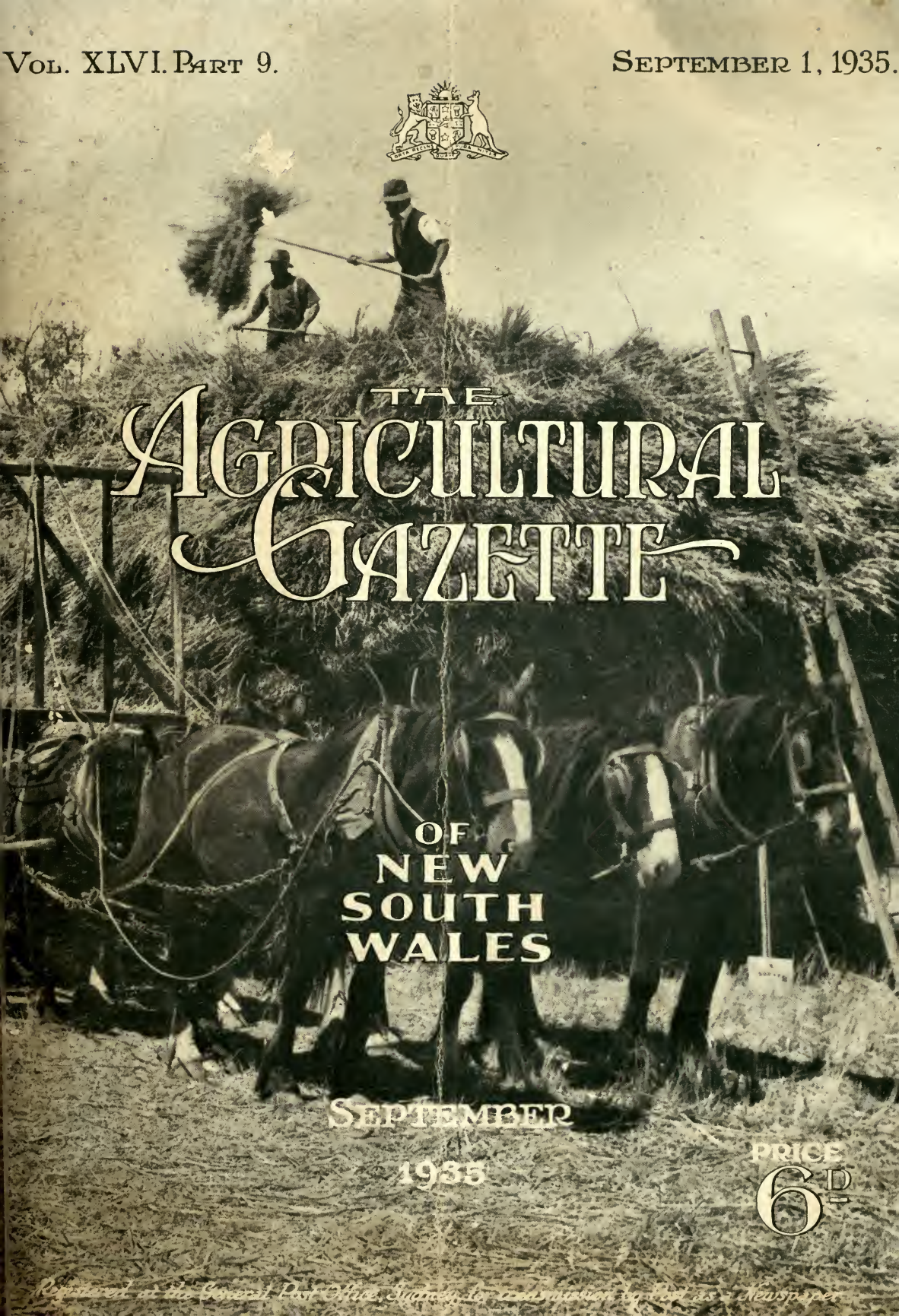
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SEPTEMBER

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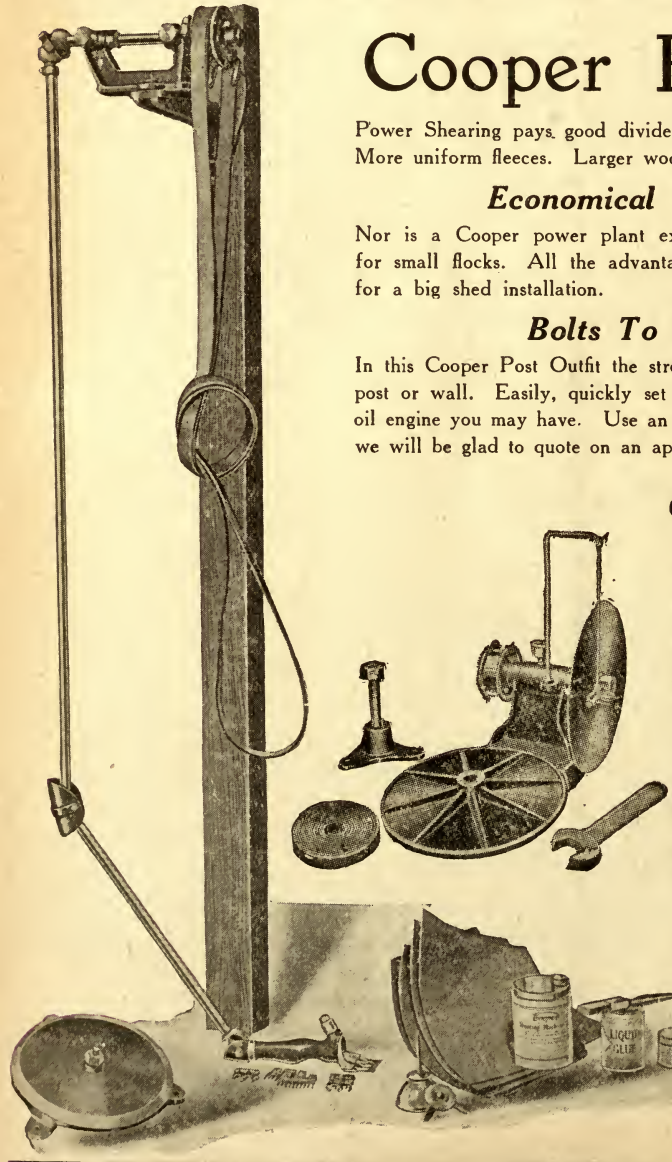
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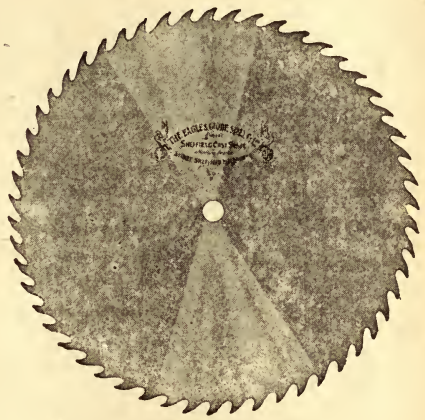
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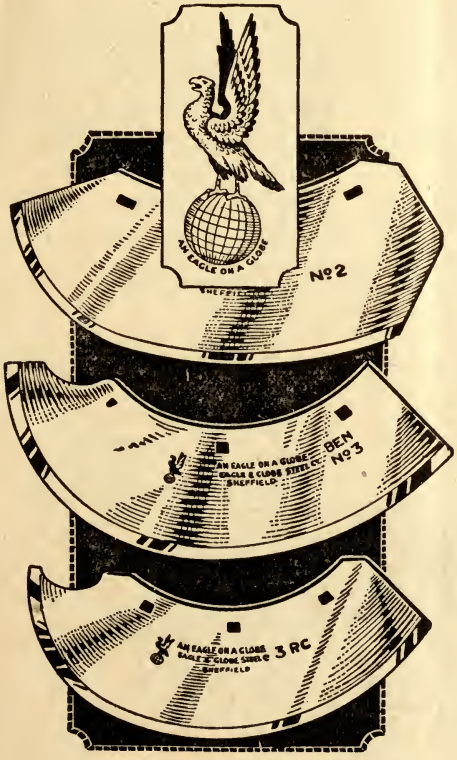
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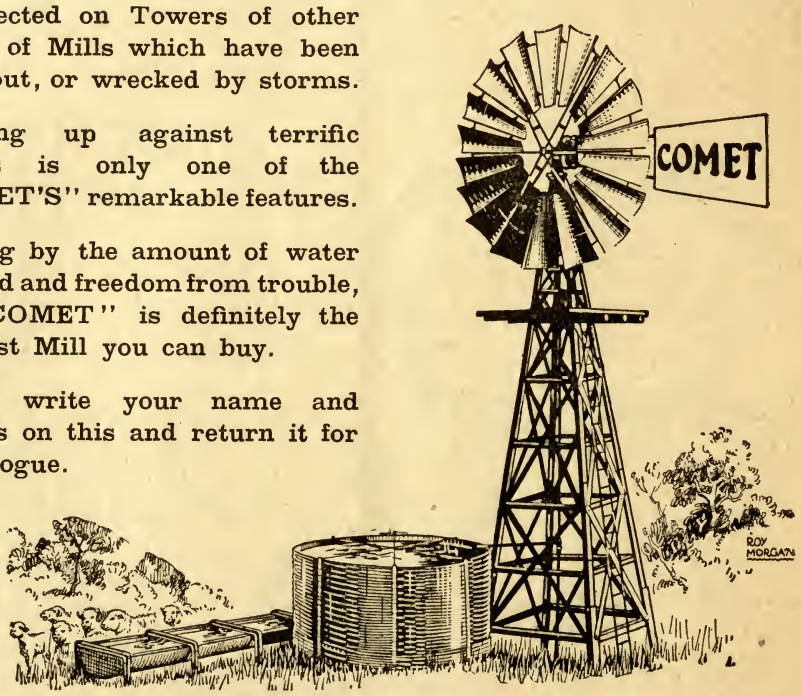
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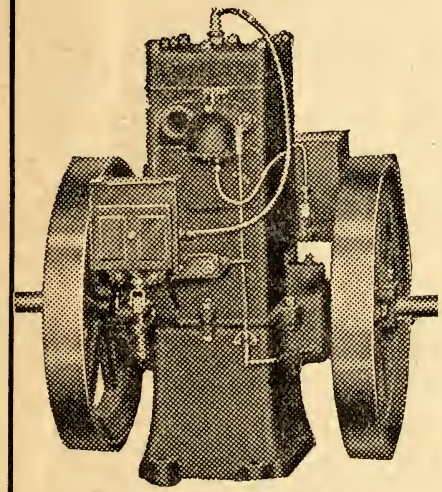


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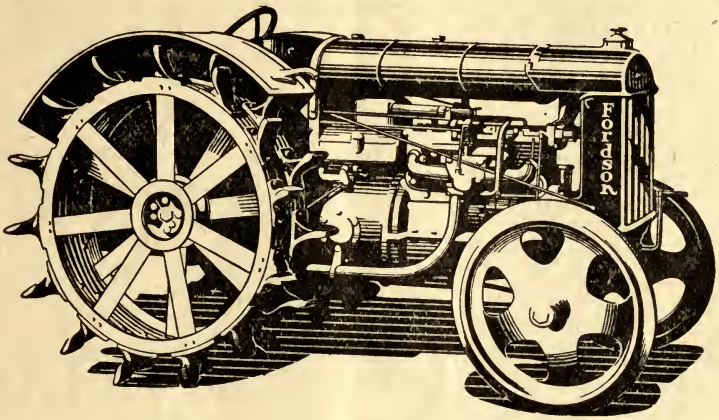
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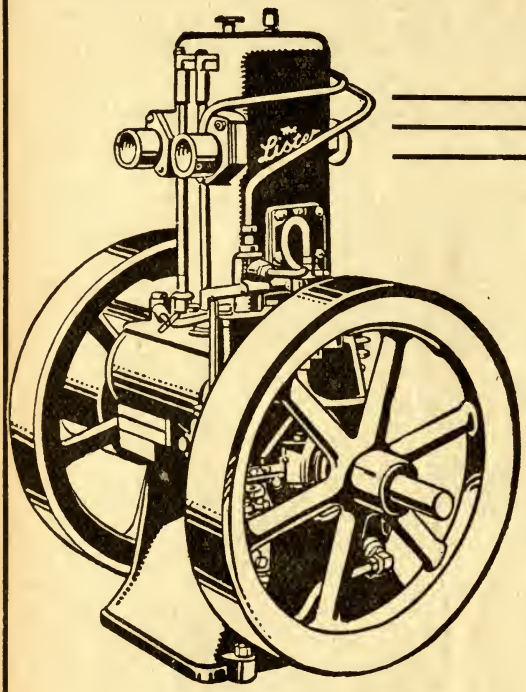
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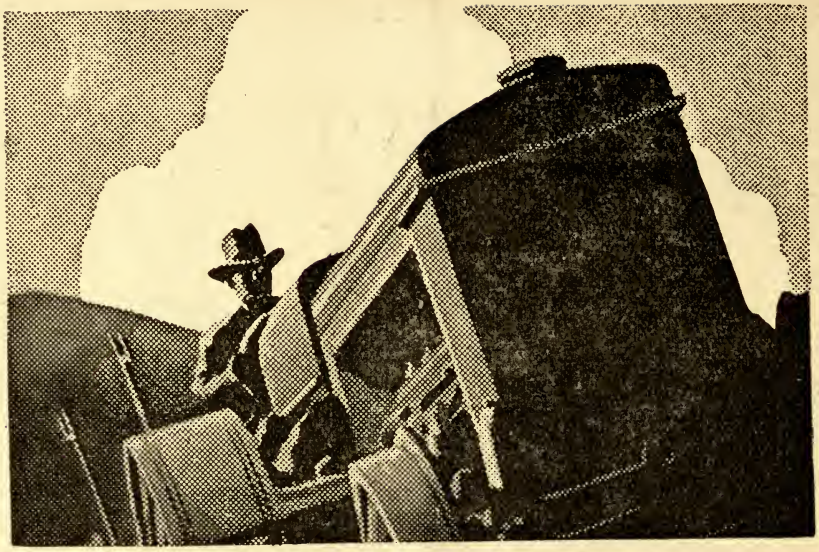
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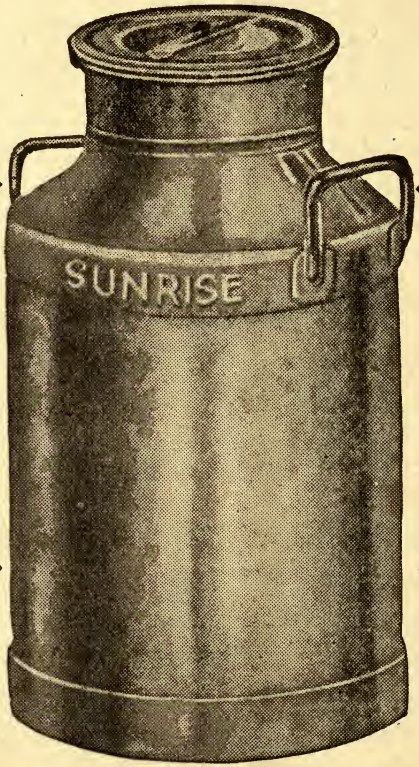
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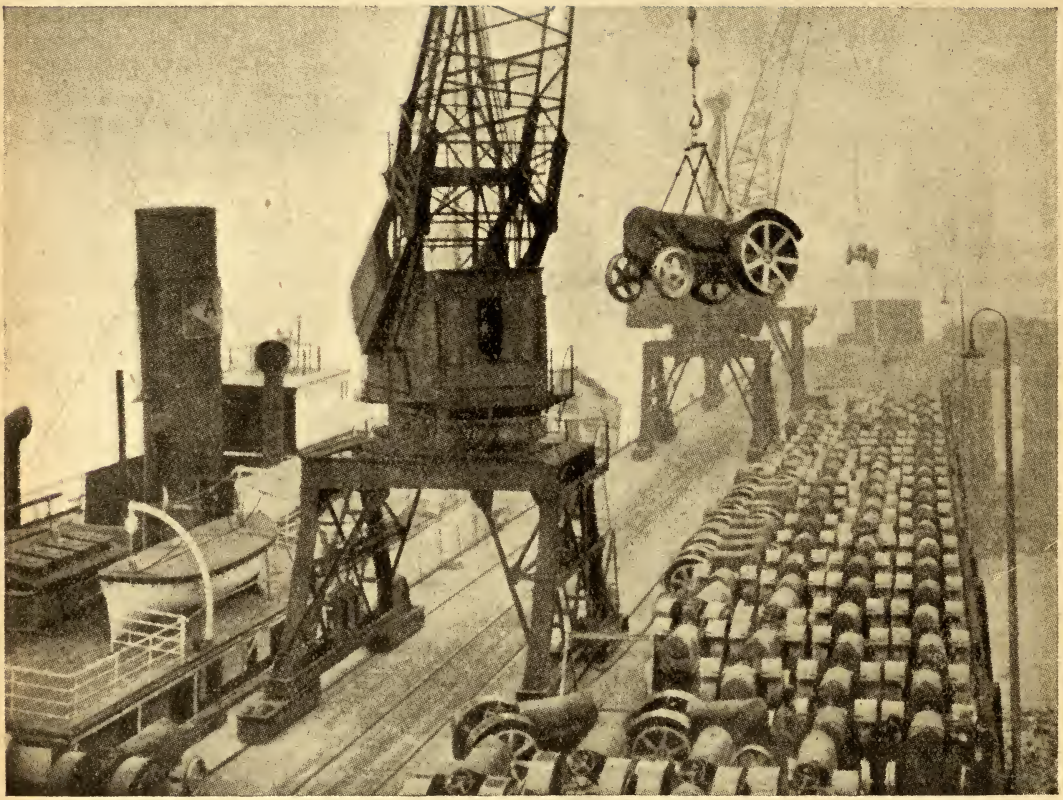
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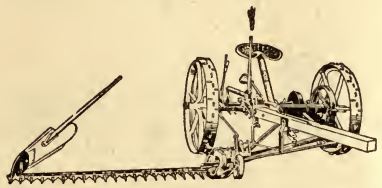
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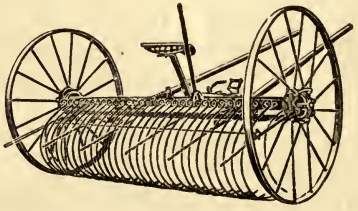
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Vol. XLVI. Part 9. *SEPTEMBER* 1, 1935.

. . THE . .

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. . OF . .

NEW SOUTH WALES.

Guaranteed circulation over 16,400 copies per month.

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1935

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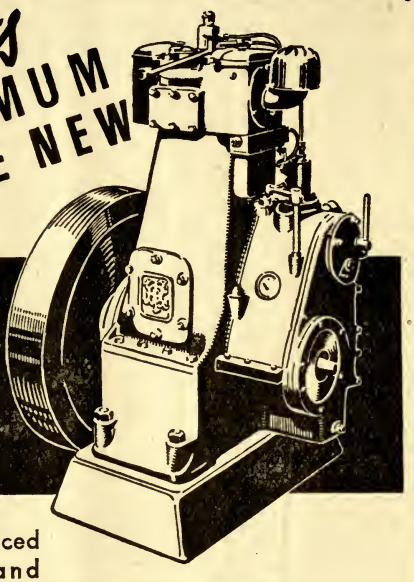
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THE AGRICULTURAL GAZETTE OF NEW SOUTH WALES

Vol. LXVI. Part 9. September 1, 1935.

Our Wheat Areas Menaced By Skeleton Weed.

L. Judd, H.D.A., Senior Agricultural Instructor, and
K. G. Carn, H.D.A., Agricultural Instructor.

Skeleton weed is the most insidious and drastic menace wheat-farmers in New South Wales have ever had to contend with. Although not regarded as a weed of any consequence in other countries, conditions in this State have encouraged a vigorous growth, with the result that it has become established over the south-western slopes and Riverina, and central-western slopes as the worst smothering weed ever experienced in this country. In 1935 hundreds of acres of cereals could not be harvested due to skeleton weed, and farmers were forced to let the crops rot in the paddocks.

Skeleton weed (*Chondrilla juncea*) has become one of the most serious pests with which wheat farmers have had to deal because of its smothering habits, excessive powers of reproduction, and its ability to resist strenuously attempts to eradicate it, coupled with the fact that normal cultivation of crops tends to stimulate the natural vigorous growth.

Description of Growth and Habits.

Skeleton weed so called in this country is a member of the *Chondrilla* family, which is a native of the sandy soils of central Asia and has since spread to southern Europe and the United States of America. The plant somewhat resembles a dandelion in the early stages, but very quickly a thick, fleshy taproot is established, and some three to four months later the skeleton-like top growth is made, reaching a height of from 2 to 4 feet. The root system if damaged exudes a white sticky sap. The normal period of growth commences during May and continues slowly until mid-spring, when the vigorous top growth is made, ending with profuse flowering and seeding during the latter portion of summer. The top growth then dies back, but the root is of a perennial nature, and fresh growth is made from the old root the following autumn.

During recent years the plant appears to have become more acclimatised, and growth has occurred during all stages of the year, but the flowering and seed setting take place during late December, January, February, March and April. When nearing maturity the early rosette formation of leaves die, leaving only the top growth. The basal portion of the stems has a thick covering of bristles or hairs. The flowers are borne singly, and are conspicuous by the yellow

colour. The seed resembles that of lettuce, but is not as plump, and has a white parachute attached.

The plant possesses remarkable vigour in ability to produce seed, and if plants are cut off when nearing flowering stage the cut-off portion of the plant will flower and set seed. The flowers are normally borne on the upper portion of the plant, but when heavily grazed or cut, flowers will form right on the ground. This action is a most important point in the control of seeding.



Skeleton Weed.

A. Root growth, basal leaves and lower portion of topgrowth. B. Typical leaf. C. Branchlet, showing narrow stem leaves and flower-heads. D. Flower-head. E. Floret, showing 5-toothed ligulate corolla. F. Fully developed muricated seed with stalked parachute-like pappus. G. Seed enlarged to show the ribbed exterior. *W.A. Dept. Agric. block.*

The root growth consists mainly of a fleshy taproot which grows straight down to a depth of 5 to 6 feet, but occasionally side roots are in evidence, especially after any interference with the plant by machinery or chemicals. This root is filled with a white, rubbery sap, and is the difficult portion to eradicate. Cultivation stimulates growth, as two or three shoots will appear where the root was cut off, and the portion that is cut off will grow if soil moisture is suitable.

When taken out to a depth of 2 feet this root growth will again force its way to the surface. The weed rarely reproduces from the root unless the plant is damaged in some way. Besides the growth described above the side roots will develop buds and a new plant is quickly established, generally about a foot to eighteen inches from the parent plant. In the event of chemicals eventually killing out this parent plant, unless the action is very quick these new plants will become established before the old plant dies out. This accounts for new plants appearing around salt-treated plants where conditions were dry and penetration of the salt too slow.

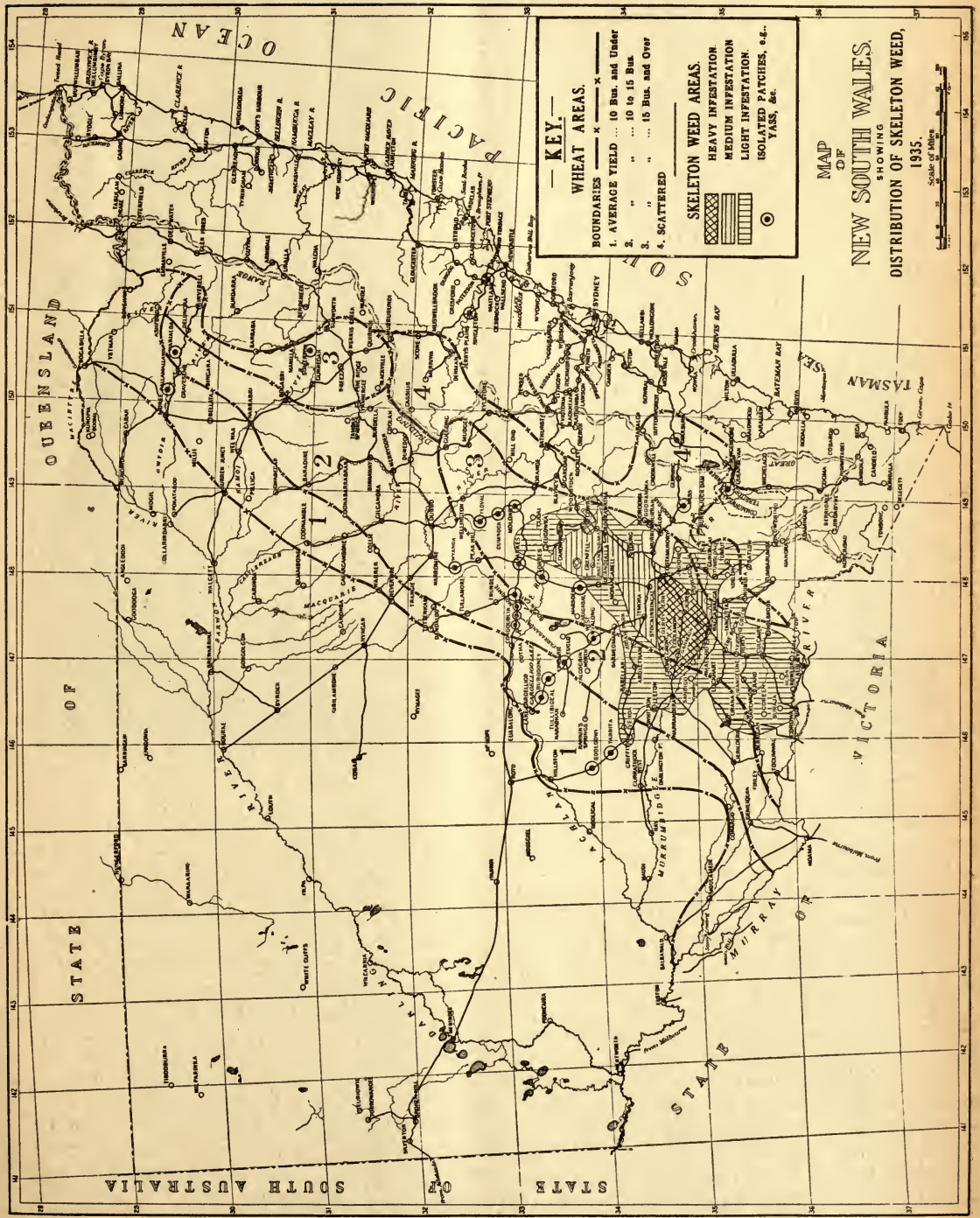
Introduction to New South Wales.

The method of introduction is problematical. Some farmers are of the opinion that the plant was originally introduced over



Skeleton Weed in Mature Stage.

twenty-five years ago in packing grape vines from southern Europe. However, it is practically certain that the seed was also imported in hay from the United States of America in the 1914 drought.


— KEY.—
WHEAT AREAS.
BOUNDARIES
1. AVERAGE YIELD ... 10 Bus. and Under
2. " " ... 10 to 15 Bus.
3. " " ... 15 Bus. and Over
4. SCATTERED
SKELETON WEED AREAS.
HEAVY INFESTATION.
MEDIUM INFESTATION
LIGHT INFESTATION
ISOLATED PATCHES, e.g., YASS, &c.
MAP OF NEW SOUTH WALES.
SHOWING
DISTRIBUTION OF SKELETON WEED, 1935.
Scale of Miles
PACIFIC OCEAN
QUEENSLAND
STATE OF NEW SOUTH WALES
STATE OF VICTORIA
STATE OF SOUTH AUSTRALIA
TASMAN SEA
MURRAY RIVER
MURRUMBIDGEE RIVER
DARLING RIVER
MACQUARIE RIVER
CASTLEREAGH RIVER
NAMOI RIVER
GWYDIR RIVER
CLARENCE R.
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MACLEAY R.
MACINTYRE R.
BARWON R.
WARREGO R.
BOGAN R.
LACHLAN R.
DARLING DOWNS
LIVERPOOL PLAINS
CASTLEREAGH
MACQUARIE MARSHES
MURRUMBIDGEE IRRIGATION AREA
MURRAY IRRIGATION AREA
SYDNEY
NEWCASTLE
BRISBANE
MELBOURNE
ADELAIDE
CANBERRA
GOULBURN
ORANGE
BATHURST
DUBBO
TAMWORTH
GUNNEDAH
NARRABRI
MOREE
WALGETT
COONAMBLE
GILGANDRA
COOLAH
COONABARABRAN
GULGONG
MUDGEE
WELLINGTON
NYNGAN
CONDOBOLIN
PARKES
FORBES
YOUNG
COOTAMUNDRA
GUNDAGAI
TUMUT
WAGGA WAGGA
ALBURY
HOWLONG
COROWA
DENILIQUIN
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BOURKE
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MOSS VALE
KIAMA
WOLLONGONG
NOWRA
BATEMAN BAY
MORUYA
CANDELO
EDEN
BERRIMA
MITTAGONG
CAMDEN
PICTON
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KATOOMBA
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MAITLAND
CESSNOCK
SINGLETON
MUSWELLBROOK
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MURRURUNDI
GUNNEDAH
TAMWORTH
GLOUCESTER
TAREE
WINGHAM
KEMPSEY
NAMBUCCA HEADS
MACKSVILLE
GRAFTON
MACLEAN
YAMBA
CASINO
KYOGLE
LISMORE
BALLINA
MURWILLUMBAH
TWEED HEADS
TENTERFIELD
GLEN INNES
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UNIVERSITY
GUYRA
INVERELL
BINGARA
MOREE
NARRABRI
COONABARABRAN
GILGANDRA
COONAMBLE
WALGETT
BOURKE
LIVERPOOL PLAINS
DARLING DOWNS
MACQUARIE MARSHES
MURRUMBIDGEE IRRIGATION AREA
MURRAY IRRIGATION AREA
1
2
3
4

The first notification of its presence was recorded in 1915, when Mr. E. Field, of Wave Hill, Marrar, forwarded plants to Mr. Maiden, who made inquiries in other countries as to its importance. The overseas countries did not regard the weed as serious, but it was quickly seen that the local conditions were suited to a vigorous growth, and the weed has become established over the south-western slopes and summer rainfall areas of New South Wales it will become even more troublesome on the light soils.

Damage Caused by the Weed.

Skeleton weed ranks as the most insidious and drastic menace wheat farmers have ever had to contend with in this State. Right from its introduction it has been heralded by farmers as a plant possessing excellent



A Count Made in This Paddock Revealed over 250 Plants per Square Yard.

Riverina and central-western slopes as the worst smothering weed ever experienced in this country.

In a period of twenty years the weed has spread to the Victorian border, west to the Irrigation Areas, Parkes to Cudal, and north to Carcoar. To date the greatest loss has been caused on the undulating slopes, including Wagga, Coolamon, Temora, Young and Cowra. At the latter place, although the weed has been in evidence since 1918, the spread has not been so spectacular, probably due to the heavy stocking of sheep this country is subjected to compared with Coolamon-Wagga wheat areas. Skeleton weed is a native of a very low rainfall area (approximately 12 inches per annum), but this is mainly a summer rainfall, and it is reasonable to surmise that as this weed reaches some of the northern grazing qualities. The appearance of isolated palatable green plants in dry stubble paddocks cloaked the weed with innocence and allowed it to gain a foothold over wide areas of the State. These isolated plants in normal dry summers were readily eaten by stock, often being the only green feed in the stubbles.

The weed first appears as single plants, then assumes characteristic patches of ten and twenty square yards, and from this stage, if neglected, gradually spreads and totally smothers the cereal crops. In 1935 hundreds of acres of cereals could not be harvested due to the weed, and farmers were forced to let the crop rot in the paddocks, with subsequent danger of dietetic trouble in stock.

In one hundred per cent. infested country further cereal grain production is not pos-



Skeleton Weed in Sole Control.
This paddock in 1930 yielded 30 bus. wheat per acre, in 1932 skeleton weed reduced the yield to 10 bus. per acre, while in 1934 the area had to be abandoned.

sible, but the menace or damage is not only confined to the heavily infested country. On light to medium infested country the weed causes not only reduction of yield, but a weakened straw and lodged crops. The lodged crop is difficult and often impossible to harvest, because of the damage to machinery when endeavouring to take the grain from these patches. The stem of skeleton weed is coarse, wiry and tough, and winds around shafts, causing irreparable wear throughout the machine, especially in the drums and conveyors, with smashing of false combs. Summarised, the cost of harvesting is in direct ratio to the poorness of the crops and infestation of skeleton weed.

Reduces Revenues and Decreases Land Values.

This reduction of yield is immediately reflected in the revenue from the farm and the area is then classed as grazing country, and, in 100 per cent. infestation parts, only second-class grazing land at that. The obvious immediate loss is revenue, and, indirectly, land values.

Land infested with skeleton weed means annually recurring and heavy expenditure to maintain production by means of extra fodder cropping, continual work to prevent seeding, modified systems of farming, including rotation, cultivation, pasture improvement, etc., and stocking, which tend to make farming costly.

The problem becomes very difficult on smaller areas of close settlement, as it has yet to be proved that with sheep as the major avenue the revenue can be maintained to support present valuations and the cost of changed systems of agriculture on these restricted areas.

On grazing areas the weed is of vital importance, as, in many years, the loss of feed during the winter months will necessitate either heavy hand feeding or the growing of fodder crops to carry stock when the skeleton weed is dormant. In the better rainfall areas towards the tablelands, systems of pasture renovation will be necessary to maintain normal carrying capacity. On land that is neglected only a short period elapses before one is left with little else than a mass of unpalatable and innutritious fodder. In localities in the Riverina where the weed has gained control a little ball clover grows, but no other plants appear to thrive in competition with the weed. Stock will not penetrate the rank growth, and tracks have to be cut to get them through the paddocks. Admittedly growth has been vigorous following two wet summers, but this kind of summer is experienced from time to time throughout our wheat areas.

In southern Europe the weed has become a serious pest of vineyards, and the position here must be carefully watched, as the weed has already appeared in orchards. Eradication of this weed will prove very difficult and costly in established orchards and vineyards, and the loss of soil moisture is likely to prove disastrous to yields of farm orchards.

In Our Next Issue.

In the next instalment of their article on skeleton weed Messrs. Judd and Carn will deal with the subject of control.

"It has been argued," they say, "that an effective method of eradication has not been devised, but experiment work definitely proves that skeleton weed can be economically destroyed where only isolated plants or small patches are present, and it must be pointed out that the reward of £5,000 is for an economical and complete method of eradication on heavily infested country."

In the marginal wheat areas of this State a vital problem presents itself. The weed has appeared over a wide area of this country, and can be seen in absolute control of cultivation land that has only a 15 to 16 inch rainfall. The economic position of the wheat industry in this low rainfall area has left no available funds to fight a weed of this nature. Grain yields have been low and erratic, and any further loss from competition with skeleton weed would throw farmers into a state of chaos. The only solution in these cases appears to be drastic preventive measures designed to avoid possible introduction, and complete eradication of any plants that appear. These efforts should be systematically controlled, perhaps on an organised community basis.

Warning to Farmers on Clean Areas.

To those situated on clean areas the foregoing description of the plight of many farmers in southern New South Wales should arouse them to the seriousness of this devastating menace. In clean areas a grave responsibility rests upon those in charge of shire and municipal affairs. It is also the duty of every organised agricultural body to assist wherever possible in any campaign of eradication and prevention.

Although there exists a practical and efficient method of eradication for isolated plants, the Government's offer of £5,000 as a reward for an economical method of eradication on heavily infested country should serve as a warning regarding the seriousness of neglect in the early stages.

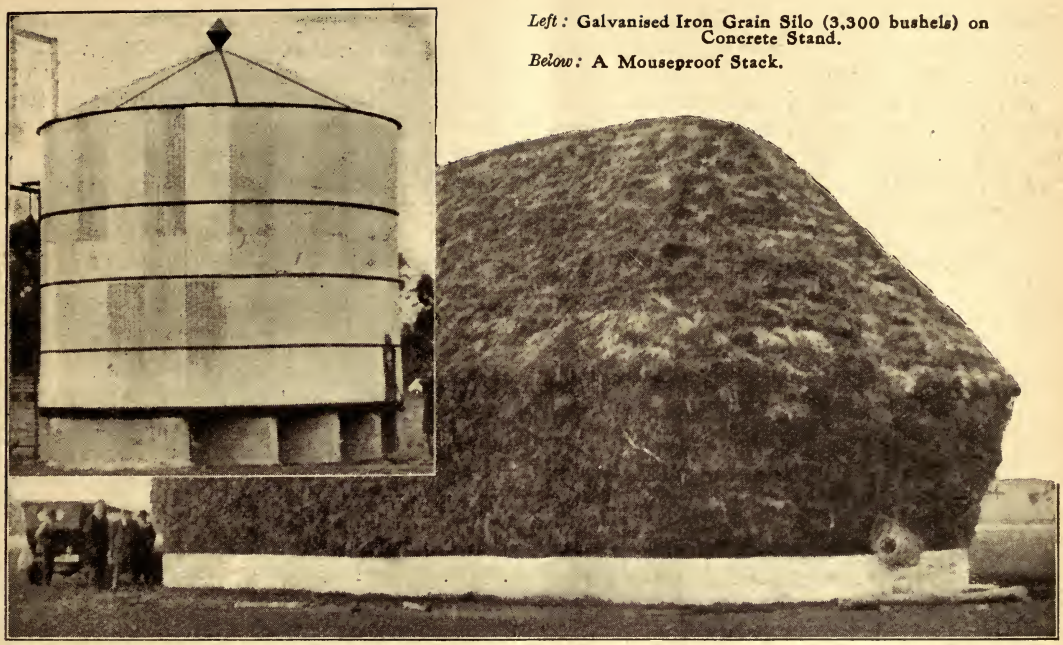
(*To be continued.*)

Why are Merinos Less Fertile in Australia?

THE fertility of Merino sheep in Australia cannot be considered satisfactory. The average lambing percentage of all studs in New South Wales is only 65 per cent. and in Queensland 55 per cent., whereas America's experience suggests that percentages up to 130 are not impossible.

In an address given to delegates to the recent State Conference of the Agricultural Bureau by Dr. I. Clunies Ross on recent advances in the application of science to annual breeding, it was pointed out that it was necessary to determine just how far this relative fertility of the Australian Merino was due to heredity and how far to nutritional and other factors. Comprehensive investigations had been begun by Mr. R. B. Kelley, of the Council for Scientific and Industrial Research, the results of which could not fail to be of great interest and importance to the Commonwealth.

In this connection it was somewhat disquieting to note that the percentage of world Merino wool clip supplied by Australia had shown a progressive decrease, while very great increases had been shown by South Africa and the United States. It might be argued that little value might accrue from increased production in Australia in view of the possible limitations in world demand for wool. Such a policy should not be accepted, since there appeared at least a reasonable prospect of an increasing demand from the Far East more than compensating for possible contraction in Europe, while the latter decrease might only be temporary.



Left: Galvanised Iron Grain Silo (3,300 bushels) on Concrete Stand.
Below: A Mouseproof Stack.

"Fodder Consciousness."

Promoted by Fodder Conservation Competitions.

H. C. STENING, H.D.A., Chief Instructor of Agriculture.*

AT the present time it is a matter of prime importance to the satisfactory development of our primary industries that there should be an extension of the practice of fodder conservation, and in that direction the fodder conservation competitions promoted each year by the Royal Agricultural Society are serving a very useful purpose in that they are helping to build up among stock-owners what might be termed a "fodder consciousness."

In consequence of the low returns from wheat farming there is a gradual tendency to carry more livestock, especially in the direction of the production of fat lambs. If the fat lamb trade is to be attended with success, it will be necessary to ensure a continuity of supply of uniform prime quality, and to do this adequate fodder reserves are essential. The same applies to the chilled beef industry, as the growing animal must not receive a check if high quality is to be produced to meet the keen competition in overseas' markets. The conservation of fodder is considered of greatest importance and is practised extensively in Argentine (our greatest competitor in the beef trade), although she is favoured with better rainfall and more fertile soils, and if this new industry is to flourish in New South Wales provision of adequate fodder reserves must be made to meet any seasonal deficiencies, in order that a continuous supply of prime quality beef may be maintained.

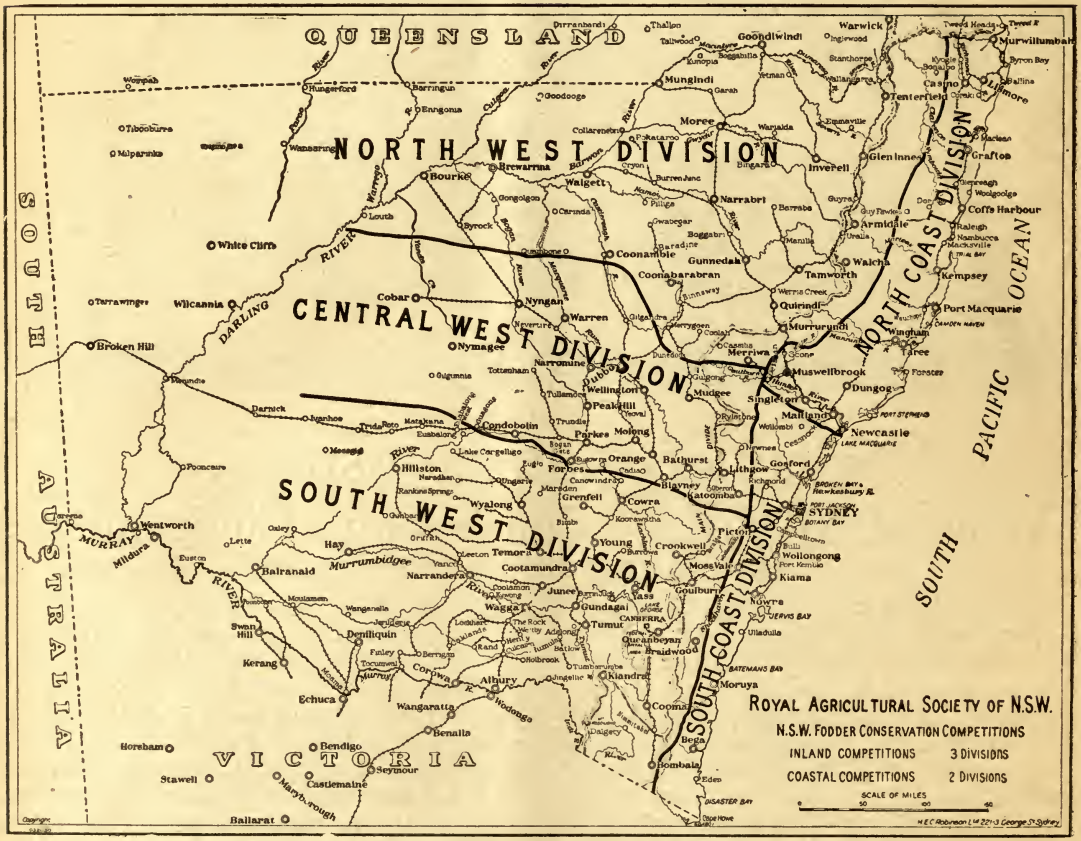
The competitions in inland districts this year were the most successful to date, showing considerable improvement, both as regards the number of entries and the general high standard of the exhibits. The total number of entries in the forty-seven district competitions totalled 202, which is a marked improvement on the previous year's twenty-seven competitions and 125 entries.

There was a rearrangement of the championship zones last year, the inland agricultural areas being divided into three zones, as shown on the accompanying map. Furthermore, in each of these divisions, an ad-

* Mr. Stening judged the Royal Agricultural Society's Fodder Conservation Championships.

ditional championship was held for graziers whose holdings have a carrying capacity of 4,000 sheep or more.

A pleasing feature of this year's competitions is that twenty of the thirty-three competitors (60 per cent. as compared with 57 per cent. the previous year) in the open competitions had accumulated sufficient reserves of fodder for the hand-feeding of their stock on a full ration for a period of nine months, in spite of the fact that some of the reserves had already been drawn upon in consequence of the dearth of feed in the paddocks due to the dry spell and the earlier ravages of grasshoppers.



Map Showing Rearrangement of Fodder Conservation Championship Zones.

A Two-years' Supply of Horse Feed.

Cereal hay was included in the reserves of all but six competitors. For the feeding of horses wheaten or oaten chaff is the ideal fodder, and as all competitors possessed horses there should be sufficient cereal hay conserved not only to maintain the horses in good working condition throughout a normal year, but to insure against a crop failure. The aim should be to have two years' supply of hay for the horses on hand at the completion of the hay harvest.

For storing for lengthy periods, as for a drought reserve, cereal hay has several disadvantages, for it is subject to depreciation when exposed to the weather and to damage as the result of depredations of mice, rats and stock, and there is, moreover, always the danger of fire. Adequate protection entails much expense and for the storage of fodder for sheep or cattle silage is to be preferred.

Conserve More Silage.

Ensilage is a more economical and safe method of conservation and the fodder is preserved in a succulent form, which renders it very suitable for feeding to stock

during dry periods. The number of competitors who adopted this method was thirty-one, or 67 per cent. of the total entries. There is room for extension in the conservation of fodder as silage, not only by competitors, but by stockowners generally. According to the latest statistics, there were 26,402 tons of silage made on 294 farms in inland areas in the year 1933-34, as compared with 30,439 tons on 263 farms in the preceding year; thus, although more stockowners are interesting themselves in this form of conservation there was a decrease in the total quantity of silage made. Of course, the nature of the season is an important factor governing the quantity of silage conserved in any year, and 1933 may not have been a very favourable season. However, when considered in relation to the 16½ million sheep carried in that portion of the State where the combination of wheat and sheep farming is largely followed, namely, the western slopes, the total quantity of silage conserved each year in inland areas is negligible and discloses a deplorable neglect on the part of the average stockowner to make any provision for the maintenance of his stock during lean periods.



Above: With Stacks there is always the Danger of fire.
Note the bed of ashes; all that remains of a fine stack of hay.

Below: Opening up the Pit Silo for the Judge's Inspection.
With silage there is no fire risk.



Stack Method Wasteful.

The trench method was used by all competitors but two, who employed the stack method. Four conserved silage in stacks as well as in a trench, but the excessive spoilage that had occurred around the outside of the stacks and extending up to two feet into the stacks should be sufficient evidence to convince them that the stack method is not economical. Two competitors had stacks completely covered with soil, top and sides, but the waste was much greater than in a trench silo and, moreover, more difficulty would be experienced in covering the stack, while the removal of the top soil from the land in the vicinity is considered detrimental. In the circumstances a shallow trench has undoubted advantages.

Trench Silage Twenty-three Years Old.

The chief objection raised to the trench silo is the difficulty of removing the silage for feeding. If the trenches are made no deeper than four or five feet there should be no complaint on this account. In nearly all the trench silos the silage was in good condition right to the top, with practically no waste. It was most interesting to note the perfect condition in which the silage opened up after being conserved underground for twenty-three years in a trench silo on the property of Mr. A. Brunskill, Wagga. No better demonstration is required to prove that fodder can be preserved in a succulent form in this manner for an indefinite period without deterioration.

Some Poor Quality Lucerne Hay.

A very satisfactory improvement has been shown in regard to the conservation of lucerne hay; thirty-eight competitors included it in their reserves, which is 82 per

cent. of the total entries, as compared with 73 per cent. in the previous year.

Lucerne hay is of special value for combining with cereal silage and thus providing for an improved and more economical feeding ration. More attention is required to the curing of the hay in order to produce a satisfactory sample; much of the hay was very stalky and evidently the leaf had fallen and was left in the paddocks. As the leaves contain the greater amount of nutrients the hay is considerably reduced in feeding value, and unless a good sample of hay can be produced it would be advisable to conserve the lucerne crops as silage. By reducing the amount of handling, the baling of hay as practised by several competitors saves much loss of leaf and the advantages of baling may be summed up in "ease of handling, ease of storage, and ease of feeding."

Many competitors have erected galvanised iron silos for the storage of grain, and this method is deservedly becoming more popular. Grain is one of the most satisfactory forms of conserved fodder; it is a concentrated food which occupies relatively small space for storage and there is no loss of nutrients as the result of conservation, provided it is satisfactorily protected from moisture and pests. For this purpose the air-tight galvanised iron silo is, without question, the most effective.

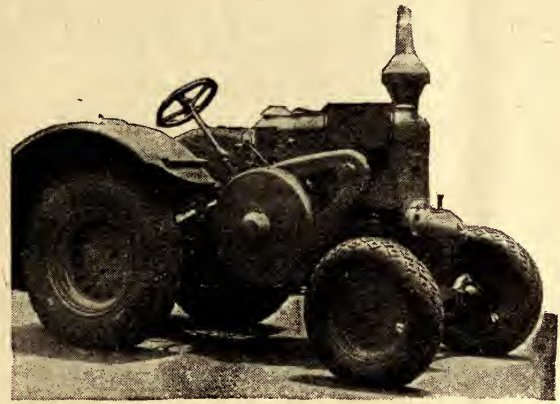


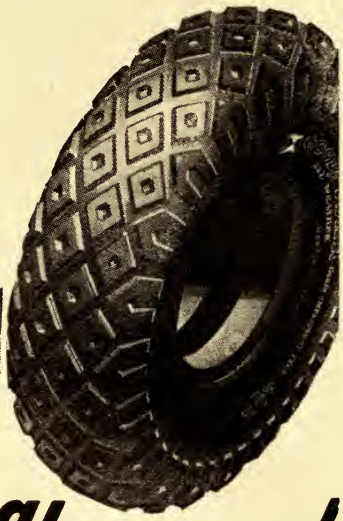
Well Protected Haystacks on Mr. E. E. Martin's Property, Bodangora Station, Wellington.

Growers of Pure Seed Maize.

THE following growers have supplies of pure seed maize of the varieties indicated, and farmers who require pure seed should get into direct touch with them:—

Duncan	A. Mottram, Numba, via Nowra.
Early Morn	E. D. Ogilvie, IlParran, Glen Innes.
Fitzroy	Manager, Experiment Farm, Grafton.
	A. Loutitt, Moruya.
Funk's Yellow Dent	J. A. L. Thompson, South Gundagai.
	J. A. Martin, Pambula.
	N. S. Bate, Bodalla.
Golden Beauty	W. R. Mitchell, Lower Towamba, via Eden.
	J. G. Stitt, Taree.
Golden Nugget	G. Smith, Wauchope.
Golden Superb	J. G. Stitt, Taree.
Hickory King	W. J. Went, Pambula.
	W. Caffery, Pyree, via Nowra.
	J. B. Koch, Tenterfield.
Iowa Silvermine	E. D. Ogilvie, IlParran, Glen Innes.
Leaming	W. R Mitchell, Lower Towamba, via Eden
	Manager, Experiment Farm, Grafton.
Manning Pride	J. G. Stitt, Taree.
Manning Silvermine	R. Lowe, Lower Portland, via Windsor.
Manning White	E. H. McLeod, Tinonee.
Murrumbidgee White	Elsworthy Bros., Tarabandra, via Gundagai.
Pride of Hawkesbury	J. G. Stitt, Taree.
	H. O. Cox, Kangaroo Valley.
Ulmarra Whitecap	J. Flanders, Ulmarra.
Wellingrove	J. T. Elliott, Dangarsleigh, via Armidale.
	E. D. Ogilvie, IlParran, Glen Innes.





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Stocks of Goodyear Tyres, Tubes and Wheels now available for all popular makes of tractors, including:—

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Case
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McDonald Imperial
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The main purpose and endeavour of active educational effort must necessarily be the training and equipping of youth to face and successfully surmount the trials and problems of life.

In all things, a habit commenced in childhood, while the mind and individuality are plastic, is far more likely to prove lasting than when begun later in life.

It was with a full conception of at least one great purpose in the pursuit of knowledge that the Commonwealth Savings Bank planned its service to apply as directly for the benefit of children as for adults. The depositing of regular weekly sums in a Savings Bank account is a practical and logical illustration of the thrift lesson, and the Commonwealth Savings Bank has extended its facilities throughout all Australia to make that lesson easy and valuable.

Commonwealth Savings Bank of Australia

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Recent experiments carried out by the Department of Agriculture have shown that on the North Coast all sown pastures require frequent light top dressings of a Nitrogenous Fertilizer, if maximum production is to be obtained.

Plots receiving light applications of:—

GRANULATED CHILEAN NITRATE OF SODA

produced up to five times as much growth as the untreated areas.

Consult your merchant now. Ask for a sample and price.

Address enquiries:—

Chilean Nitrate of Soda Agricultural Service,
44 Margaret Street, Box 2037 L, G.P.O., Sydney.



Fodder Conservation in the Central West.

Championship Results, 1935.*

Drought holds few terrors for the farmer or grazier who has stored up adequate fodder reserves. Dry periods such as have recently been, and in some districts are still being, experienced give the fodder conservation enthusiast little concern, for not only is he insured against the loss of his stock but also against the subsequent heavy expense of re-stocking.

Mr. K. Gault, of "Lynwood," Trundle, who has carried off the championship of the central west in each of the last four years, supplies an excellent example of what is possible in the direction of economical conservation of fodder on a wheat farm which is in no way favoured as regards either soil or climatic conditions.

The area of Mr. Gault's property is 1,161 acres, of which 110 acres carries lucerne crops, chiefly for grazing purposes, 250 acres have been sown with wheat, 50 acres with oats, and it is proposed to fallow 400 acres. Any scarcity of feed in the paddocks at any period is well provided for by ample reserves, which include 293 tons of silage made from wild oats and conserved in three trench silos, 142 tons cereal hay in ten small round stacks, 41 tons lucerne hay in five stacks, and 78 tons of wheat grain stored in galvanised iron silos.

This total quantity of fodder is nearly three times what is required for the purpose of the competition, being sufficient for the feeding of 1,556 sheep. The whole is well protected against depreciation; the 15-ton round haystacks are neatly arranged on permanent sites in a stackyard at a distance of a chain apart and each is surrounded with a mouse-proof barrier of galvanised iron. The space between the stacks is used to advantage by the planting of citrus trees, which are well cultivated and provide an effective firebreak.

The fodders have been accumulated at comparatively small cost, and even if not required for many years are safe from deterioration.

Scale of Points for Judging.

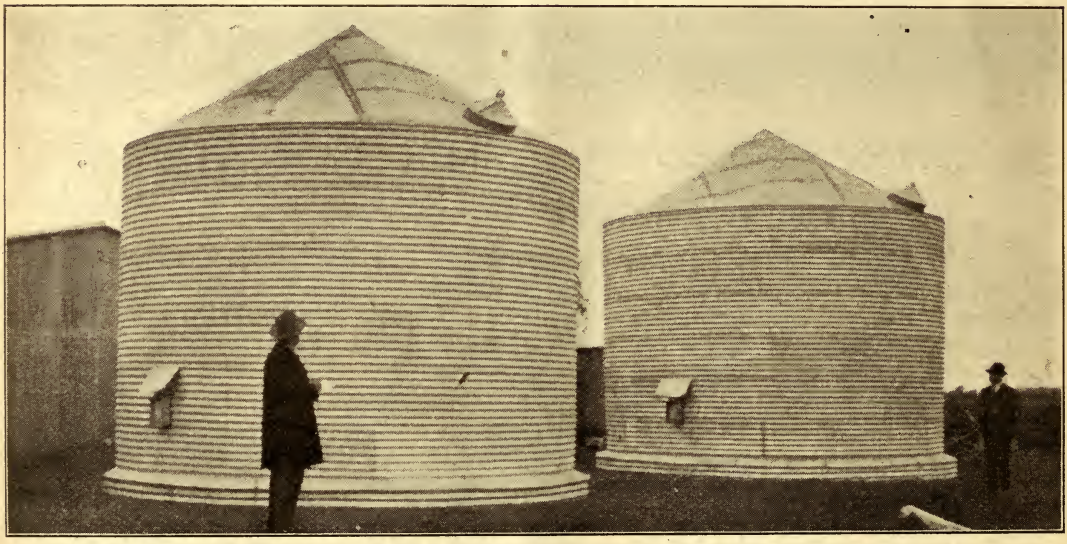
The scale of points on which the open championship was judged is set out below:

Fodders Eligible for Conservation to be—Concentrates (including all grains); or roughage, as silage or hay (*e.g.*, lucerne, oaten, wheaten, barley, clover, grass), straw, and any other fodder suitable for conservation, to have been produced on the land owned, leased or held on shares by the competitor. No farmer or grazier whose holding consists of less than 300 acres will be eligible to compete.

* This article is taken from the report of Mr. H. C. Stening, Chief Instructor of Agriculture, who judged the championship.

SCALE OF POINTS FOR JUDGING—INLAND AREAS.

	Points.
Suitability of Fodder Judged according to suitability of fodder or combination of fodders for the purpose for which they are required.	25
Quality of Fodder Judged as to appearance, apparent palatability, and nutritive and feeding values.	35
Location Location of the site, having regard to fire, flood, economy in feeding and general access.	10
Protection Protection from weather, pests, stock, fire and general deterioration.	35
Economy of Production Including land value, production, storage, and feeding costs.	15
Carrying Capacity Quantity for requirements of competitor's holding to be based on the sheep-carrying capacity of the holding (when improved and under natural pasture). The maximum amount considered to be competitor's requirements per sheep to be 5 cwt. lucerne hay or its equivalent in feeding value (1 cwt. lucerne or clover hay equals 1½ cwt. cereal or grass hay, equals 3 cwt. silage, equals 4 cwt. straw, equals ½ cwt. grain).	60
Total	180



Grain Silos (800 bags capacity each) on Mr. K. Gault's Farm at Trundle.

RESULTS of the Central Western Zone Championship—Open Section.

Competitor.	Society.	Suitability.	Quality.	Location.	Protection.	Economy of Production.	Carrying Capacity.	Total.
Maximum points		25	35	10	35	15	60	180
K. Gault, " Lynwood," Trundle	Trundle ...	23	32	9	33	14	60	171
A. R. Burrell, " Windsor," Gilgandra	Gilgandra ...	20	32	9	32	12	60	165
J. P. Cullen, " Redbank," Dubbo	Dubbo ...	23	31	8	30	12	60	164
Estate late F. H. Shepherd, " Acton," Narromine ...	Narromine ...	23	29	8	30	12	60	162
H. A. Taylor, " Cadonia," Wellington	Wellington ...	22	30	8	30	11	60	161
S. Wright, " Enfield," Leadville	Dunedoo ...	20	30	8	30	10	60	158
A. Collie, " Yarallah," Trangie	Trangie ...	18	31	8	30	10	29	126

Championship of the Graziers' Section.

The conditions and scale of points for the judging of the Graziers' Section are similar in most respects to those for the Open Section. The only variations are that the former is open only to farmers and graziers whose holdings have a carrying capacity of 4,000 sheep or over, and in the

scale of points under the heading "Carrying Capacity," the maximum amount considered to be competitor's requirements per sheep is 3 cwt. lucerne hay or its equivalent in feeding value, instead of 5 cwt., as in the "Open" competition.

Trundle's Double Success.

The championship of the Graziers' Section was awarded to Messrs. W. Berry & Sons Ltd., Trundle. Thus the Trundle Society was successful in submitting the winners of both sections.

This exhibit of conserved fodder on a 12,240-acre property is an excellent demonstration of what can be done by large landholders in making provision for the maintenance of their stock during lean periods. Lucerne crops have been established on 2,250 acres, while wheat is sown on 2,750 acres, oats on 1,350 acres, and the present intention is to fallow 2,100 acres.

Silage mainly is relied upon as a drought insurance and at the time of inspection thirteen trench silos contained just over 1,000 tons of silage made from wheat and oats. Cereal hay of a total tonnage of 287 tons was contained in five large stacks, of which four were on elevated straddles and one was surrounded by a galvanised iron barrier; thus all were well protected from damage by mice. Forty-seven tons of baled lucerne hay were stacked and protected with a galvanised iron roof and over 800 tons of wheat and oats grain were stored under cover. On the basis adopted for graziers this amount was estimated to meet the requirements of 14,627 sheep, which is more than double the carrying capacity of the property.

Awards in Graziers' Section.

The awards in the Graziers' Section are as follows:—

Competitor.	Society.	Suitability.	Quality.	Location.	Protection.	Economy of Production.	Carrying Capacity.	Total.
W. Berry & Sons Ltd., " Woodview," Trundle ...	Trundle ...	21	32	8	32	12	60	165
E. E. Martin, " Bodangora Station," Wellington ...	Wellington ...	23	31	8	30	13	45	150
E. K. Bowman, " Wargundy," Craboon	Dunedoo ...	22	31	8	30	10	32	133

The runner-up in the Graziers' Section was Mr. E. E. Martin, of Bodangora Station, Wellington, on a property of 5,000 acres, of which 290 acres are under lucerne and 1,200 acres sown with cereal crops. The fodder reserves included 294 tons silage in two trench silos, made from mixed lucerne and wild oats, 216 tons cereal hay in four stacks and a shed, 297 tons lucerne hay in four stacks, and eleven tons of wheat and oats grain. On the rate adopted for the larger holdings the total amount of fodder will suffice for 3,740 sheep, or approximately three-quarters the number of sheep the property is capable of carrying when under natural pasture.

Assistance to Build Silos.

DAIRY-farmers who desire to improve the carrying capacity of their farms should note that an advance may be obtained by approved applicants from the Advances to Settlers Agency of the Rural Bank for the erection of silos and dairy buildings. The rate of interest charged is 3 per cent. and the period of repayment is 15 years. Interest only may be paid, if desired, for the first two years.

Silos built under this scheme must be of concrete, and to the Department of Agriculture's standard. Plans, specifications and supervision are supplied free of charge if the silo is erected under this scheme.

Application forms may be obtained at the office of the Architect, Department of Agriculture, Box 36A, G.P.O., Sydney.

Australia's Primary Industries.

Their Relation to the World's Economic Position.

By SIR HERBERT WILLIAM GEPP, Kt.

In the following pages is printed the first instalment of an address by Sir Herbert William Gepp, Chairman of the Royal Commission on Wheat, Flour and Bread Industries.

This address was delivered on the occasion of the recent Annual State Conference of the Agricultural Bureau of New South Wales which was officially opened by His Excellency the Governor, Sir Alexander Gore Arkwright Hore-Ruthven, V.C., K.C.M.G., C.B., D.S.O.

The Conference was attended by some 300 delegates and visitors from all parts of the State.

After discussion with you, as representatives of the agricultural industries, of the relation of the primary industries of Australia to present world economics, I suggest that we should endeavour to appreciate clearly the main essential facts of the position generally before proceeding to a study of possible temporary and permanent amelioration.

No Prosperity in a World of Adversity.

A wise and cultured citizen of the United States who was at one time the United States Ambassador to the Court of St. James in London travelled through the United States some years ago warning his fellow citizens that no country could be prosperous in a world of adversity. I think that Australians must take this dictum to themselves, and realise that however prosperous, comparatively, Australia seems to be, Australia is part of this great world of culture and of trade and of commerce and of finance. Consequently no real and lasting prosperity can be expected in Australia whilst great portions of the world are in dire distress and poverty.

Again, it is necessary for us to realise that no single democratic country can be really happy and prosperous if there be any long continuance of undue disparities between the physical and material well-being of different large representative sections of that country.

Experiences through which we, as Australians, have gone since 1930 have made us wiser, stronger and better citizens. We have learned that we are an integral part of the great world of business, trade and culture. We have realised that our prosperity depends in the final issue upon the prosperity of the great nations inhabiting other continents. We have become convinced that the world of the nineteenth century no longer exists nor will return. We are slowly understanding that this so-called "depression" is the birth pangs of readjustments necessitated partly by the enormous increase in mechanisation and the increased

No Solution in Economic Nationalism.

The countries have been, and are still, playing a terrible game of beggar-my-neighbour without improving their own positions materially. Every movement to protect the industrial life of one country has increased the strain upon another country. Every hole stopped to prevent a tiny trickle of trade from without has clogged the circulation of goods through the world and contributed a little more to the suffocation of industry. The apparently insuperable difficulty of the position is that standards of living in the various countries are not equal, and therefore each country struggles fiercely to retain its own standard, fearful to permit the entry of goods from another country lest they have been produced more cheaply than at home, loth to reduce her own costs but prepared to subsidise exports, eager to sell but reluctant to buy, willing to borrow but chary to lend. The mockery of the position is that the boasted standards that are being guarded so jealously by most nations are pitifully low.

control by the human mind and hand over the forces of nature. We are thinking increasingly that the experience through which we are passing is in the nature of an economic revolution which will leave profound modifications in the course of world trade and in the attitude of various peoples.

Previous "Depressions."

Depressions we have had before. There was a long, bitter one after the Napoleonic wars. I recommend you who are interested in the matter to read the extracts which refer to it in the opening pages of our Second Report on the Wheat Industry. Another serious depression in agricultural industries began in the 1870's and lasted until the beginning of the present century. Both these depressions gradually passed away owing to alterations in the supply of gold and its consequent effect upon the monetary system. The discoveries of new processes, new wants and new industries were most helpful in stimulating the return to a fresh equilibrium. As far as agricultural products were concerned the rapid rate of increase shown by European and North American countries at that time meant a considerable expansion in markets. These markets had purchasing power because employment was available in the new industries.

Production Outstrips Present Demand.

Returning to our self-examination I suggest we have not yet appreciated that the increased scientific and technical knowledge and ability, which have enabled us to increase the output per unit of human labour in almost all industries, including agricultural industries, have led to certain new developments. They have made us (and many other agricultural nations as well) push our capacity to produce too far. We (and others) have developed production on rather too large a scale for the present world market.

Sub-consciously, we are still calculating upon reduced yields of agricultural products in bad seasons in the terms of, for instance, our 1914 drought, and we are assuming that thereby surplus production affecting the prices of our products will be eliminated. Apart from uneconomic production due to economic nationalism, and from the production due to a larger number of agriculturists, I suggest that we must accept as an axiom that seasonal conditions will have less and less effect in re-adjusting undesirable accumulations which hang like a pall over world markets. In the past, famine has from time to time adjusted over-production of population in China, and adverse seasonal conditions throughout the world have adjusted over-production in foodstuffs, but the nationalistic aspirations of many countries tend more and more rapidly to tie down and prevent the operation of this safety valve which kept the world of the past in some sort of equilibrium.

Is the World Position Growing Worse?

A recent cable from London contained a brief report of a meeting of the League of Nations Union, at which Sir George Paish, a former editor of the "Statist" and a noted and respected writer on social and international problems, moved a resolution urging the British Government to initiate negotiations with a view to the provisional stabilisation of currencies and to remove trade obstacles and reverse the trend of economic nationalism. Sir George said that some people might think the resolution unnecessary because trade appeared to be improving and the world appeared to be getting out of its difficulties. In his opinion the position was getting worse.

In making a search of current literature during the preparation of this address, I came across a large number of articles dealing with the subject which I have chosen for my talk. I was drafting and redrafting a brief and concise summary of world conditions when I came across a paragraph in a Melbourne *Argus* of recent date, which condenses the description so excellently that I make no apologies for quoting it verbatim. The paragraph reads:—

A WORLD-WIDE PROBLEM.

The United States has introduced a new pensions plan. Germany has a deficit for the year of £28,000,000; in Hungary suicide is almost the greatest single cause of death. In all countries

one problem gives rise to developments that represent its different aspects. Every nation is struggling to maintain or to improve the standard of living of its people. In the United States the New Deal is tottering, and it appears to be likely that with the abolition of the codes the roll of unemployment will be increased again; the elderly employed are to be removed, therefore, from the industrial field and placated with a pension. In Germany, budgetary disequilibrium is due primarily to expenditure on social services. She has been successful in reducing the number of unemployed by about 2,500,000, but the expense of labour camps, of the new army, and of forms of Government work has over-strained the finances of the country despite heavy taxation and direct levies on the people. In Hungary the distress of the peasantry, deprived of European markets for their grain and produce because of isolationist policies in other countries, has caused acute concern. In Belgium the depreciation of the belga has brought some relief, and unemployment is decreasing, but in Holland, close by, trade is beginning to slip away, and the ports of Amsterdam and Rotterdam are jealously watching the growing trade of Antwerp. The countries have been, and are still, playing a terrible game of beggar-my-neighbour without improving their own positions materially. Every movement to protect the industrial life of one country has increased the strain upon another country. Every hole stopped to prevent a tiny trickle of trade from without has clogged the circulation of goods through the world and contributed a little more to the suffocation of industry. The apparently insuperable difficulty of the position is that standards of living in the various countries are not equal, and therefore each country struggles fiercely to retain its own standard, fearful to permit the entry of goods from another country lest they have been produced more cheaply than at home, loth to reduce her own costs but prepared to subsidise exports, eager to sell but reluctant to buy, willing to borrow but chary to lend. The mockery of the position is that the boasted standards that are being guarded so jealously by most nations are pitifully low. Only one remedy has been suggested and one only seems to be possible, and that is the ever unpopular movement of retreat. Some of the barriers must be taken down, shy capital must be coaxed into the market place again.

Are World Conditions Growing Worse?

Less than a fortnight ago a cable from London was published reporting briefly a meeting of the League of Nations Union. Sir George Paish, a former editor of the *Statist* and a noted and respected writer on social and international problems, moved a resolution urging the British Government to initiate negotiations with a view to the provisional stabilisation of currencies and to remove trade obstacles and reverse the trend of economic nationalism. Sir George said that some people might think the resolution unnecessary because trade appeared to be improving and the world appeared to be getting out of its difficulties. In his opinion the position was getting worse. Signor Mussolini was making an effort to divert the Italians' attention from economic distress by military action in Abysinnia, Germany might eventually combine with Poland to attack Russia to procure food-producing lands. Britain was no longer leading the world towards well-being. If Lord Cecil and similar men throughout the world were in a position to act they could help to solve the world's difficulties.

A week or so ago a cable from Chicago described a meeting of 250 delegates calling themselves Native American Radicals, which meeting discussed the desirability of forming a third political party in the United States to fight the 1936 Presidential campaign, if subsequent economic and political developments made such a step desirable. The meeting defined its objectives as follows:—

> We are collectivists who want to supplant the profit motive by planned production as a driving force in industry. We recognise, however, that individualism will have to be retained in agriculture.

The leaders, who include several Congressmen, have invited all dissenting groups with the exception of communists to join their movement.

Developments in the Far East.

The position in the Far East, which is of such great importance to this country, is full of difficulties and serious portents. The development and utilisation of aircraft is rapidly changing the political situation in China, giving the central Government, with its unchallenged control of Shanghai and the Yangtse Valley and the consequent command of the financial resources of that rich area, the opportunity of eliminating, or at least controlling, the operations of local war lords in the various Chinese provinces.

Slowly but surely during the last few years the internal position of China has improved and it is to be hoped that this improvement will continue in spite of the immediate serious effect upon China of the action of the United States Government in raising the price of silver in the United States. This action has raised the world's price of silver, although the action was taken originally, in all probability, for internal reasons only.

Opinions of World Authorities.

It has been of great interest to me to find the magnitude of well-informed and well-written literature which is appearing all over the world at the present time concerning the problems which we are considering to-day. Highly esteemed thinkers and clear-minded statesmen and officials are giving it their full attention. I shall quote but three of them.

MR. H. G. WELLS.

In a recent statement Mr. H. G. Wells, the novelist and historian, said:

> The nations are carrying on an intense self-destructive and mutually destructive warfare behind vast tariff barriers. They are also carrying on a mutual financial warfare, a new sort of manoeuvring with money and credit of which the happier world of 1914 knew little.

MR. EDWARD C. CARTER.

The following statement by Mr. Edward C. Carter, Secretary-General of the Institute of Pacific Relations, was reported in the *Sydney Morning Herald* of 19th June, 1935:

> The outcome of the relations between Pacific countries is anybody's bet. It is a gamble between a rational and an irrational settlement. I think the situation is extremely dangerous.

THE RIGHT HONORABLE S. M. BRUCE.

Statement by the Right Honorable S. M. Bruce in the "League of Nations Official Journal of 1934," 17th September, 1934:

> The attempts of agricultural countries to protect their industries have been feeble compared with the measures taken by industrial countries to protect their agriculture. It is a question of extraordinary importance, as four-fifths of the world's population depends for its purchasing power on agricultural exports.

Mr. Bruce appealed for urgent consideration and action in this matter to prevent the establishment of vested interests based upon the present unsound position.

The Difficulties Facing Foreign Countries.

Before we criticise Governments of foreign countries for their action we must endeavour to consider in some detail the difficult positions in which they find themselves.

Germany, for instance, has been struggling hard to re-establish the industrial part of her national life. She has found a great many obstacles to this project, some of which were due to the World War and the rather unpleasant feeling which that war had naturally generated towards herself. She has always been partly a manufacturing country and partly a primary producer. It is stated that there are some 5,000,000 small farmers in Germany and, in addition, a number of large estates. She has had a serious unemployment problem for some years and naturally the depression by handicapping her secondary industries intensified this difficult situation. She felt bound to do something to protect her local farmers and at the same time endeavour to stimulate a movement from the cities to the country in order to meet the menace of unemployment.

Small-scale Farming in Germany.

Whether the settlement of artisans and others on small areas of land will enable the settlers to maintain anything like a reasonable standard of living is a matter which the future alone will decide. It seems probable that, judging by present monetary standards, these new settlers in any country must inevitably face a decline in the standard of living; however, if they are enabled to maintain their self-respect and initiative, some good may ensue. It is clear that as long as land settlement on small areas is one of the main solutions adopted by the German or any other Government, those Governments are bound to protect, as far as they reasonably can, the producers who are dependent on the local market for the scant cash return which they receive for the portion of their produce which they themselves do not use.

Italy's Problems.

In Italy, the position is not far different, and a great attempt has been made to reclaim lands which were not cultivated previously, whilst a drive for more intensive production in the better agricultural areas has also been instituted. Possibly, the feeling of isolation in a rather unfriendly world is even more prevalent in Italy than in Germany.

The Italian wheat campaign launched some six years ago aimed at making the country independent of importation of grain. Italian statesmen pointed out that the shores of Italy were, from the point of view of the importation of foodstuffs, largely dominated by the Straits of Gibraltar at one end of the Mediterranean and

the Suez Canal at the other. The demand that Italy should be made self-sufficient in foodstuffs was repeatedly made when many of the unemployed were drafted back into rural occupation. Italy has worked on Mussolini's somewhat grandiose statement:—

"Reclaim the land, with the land the man, and with the man the race."

Reactions in Britain.

Other European countries show similar reactions to the economic crisis and even in Britain, so long the freehold of free trade and cheap food, steps were taken to alter the national policy. It is not without significance that the British people have put up with the regulation of prices for many foodstuffs with so slight a demur, and there is at least one large school of political thought in the Old Country which looks on a return to small-scale farming as the most desirable way of attempting to remedy the unemployment position.

In Japan, my studies and observations in 1931 indicated that the cultivable area forms only 18 per cent. of the islands and there are some 35,000,000 to 37,000,000 people living and dependent on the agricultural industries on an acreage of only 30,000 square miles. Roughly, this represents one-third of the total area of Victoria. Until recently, the net increase in Japan's population has been approximately 1,000,000 souls per annum. Although it is now falling, the population pressure and the striking and tremendous loyalty of the Japanese people to the ideals of their nation is a fact of immense significance for a world struggling with the problem of the disequilibrium between production and consumption.

Is Increased Purchasing Power the Solution?

It has been truly said that farmers and industrial workers face each other across a great chasm. Each group can produce in abundance far more than enough to supply the present normal needs of the other. It would seem that the only way out is to increase the purchasing power of the masses. This is the fundamental economic problem of the day. The war, the progress of agricultural technique and the over-expansion into new areas, the application of mechanisation to all industries and the activities of governments in promoting agricultural production have all contributed to the intensification of this problem. The German economist Schmoller has said that, from early times to the Industrial Revolution of last century, the peasant question was the great social question; then came the problem of the industrial worker, and now again Europe is faced with an agrarian problem.

(To be continued.)

What Mr. H. G. Wells Thinks.

"The nations are carrying on an intense self-destructive and mutually destructive warfare behind vast tariff barriers. They are also carrying on a mutual financial warfare, a new sort of manoeuvring with money and credit of which the happier world of 1914 knew little."

File Your Copies of the Gazette for Reference.

THE Department often receives a request for an article which appeared in the *Agricultural Gazette* some time previously, the farmer having mislaid his copy of the particular issue he desires to consult. To enable recipients of the *Gazette* to file their copies and make full use of the journal for reference purposes in addition to perusing it for topical information, the Department has had prepared covers in which twelve monthly copies and the yearly index may be conveniently filed.

These covers are of figured cloth, with the title, volume and year in gilt on the back, and are available, price 1s. 7d. each (posted), for the years 1934 and 1935, from the under Secretary, Department of Agriculture, Box 36A, G.P.O., Sydney.

Insect Pests of Stored Grain.

Their Prevention and Control on the Farm.

T. McCARTHY, Senior Assistant Entomologist.

THE practice of storing oats, maize, or wheat on the farm for the feeding of stock during adverse conditions is coming more and more into general use. Naturally, the problem of controlling insects which attack stored grain has manifested itself, and the subject has given rise to numerous inquiries from farmers and pastoralists throughout New South Wales.



Above: Common Grain Weevil (*Calandra oryzae*).

Below: Angoumois Grain Moth (*Sitotroga cerealella*).
Below Right: Lesser Grain Borer (*Rhizopertha dominica*).



The Insects That Attack Stored Grain.

It may not be well known that some thirty species of insects are associated with stored grain in one way or another. These may be divided into two classes—(1) The primary pests which are capable of attacking sound grain, and (2) the secondary pests which attack grain only after it has been damaged by the primary pests or other agencies, and continue or complete its destruction. It is the primary pests, therefore, which chiefly concern us, and if these are kept in check, little notice need be taken of the secondary insects.

There are four primary pests to be found in stored grain—

(1) The Granary Weevil (*Calandra granaria*).

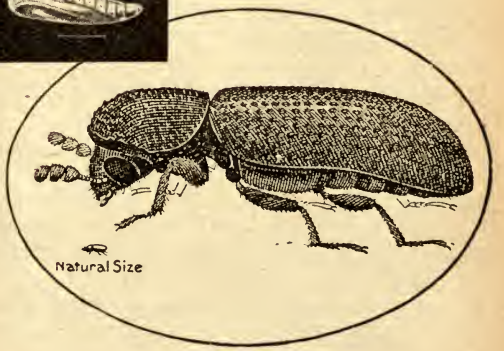
(2) The Common Grain Weevil (*Calandra oryzae*).

(3) The Lesser Grain Borer (*Rhizopertha dominica*).

(4) The Angoumois Grain Moth (*Sitotroga cerealella*).

The first of these is of little account, as it is only occasionally met with in stored grain in New South Wales. Our main concern, therefore, is with the common grain weevil, the grain moth, and to a lesser extent the lesser grain borer. Following are brief accounts of the life history of each:—

The *common grain weevil* lays its eggs in a small cavity which it makes in the grain. This precaution enables the young legless grub to enter the grain immediately after hatching to commence feeding. After passing through three stages within the grain, the grub becomes full grown, and then, still within the grain, changes into the pupa from which the adult weevil emerges. After about four days, the adult weevil eats its way out of the grain to commence its work of infesting other grains.



The female may lay several hundred eggs. Under the most favourable conditions the egg hatches in three to four days;

the larva or grub becomes full grown in from fifteen to seventeen days, and the pupal stage occupies from six to nine days. Thus the complete life cycle may occupy from twenty-four to thirty days, but this varies considerably according to seasonal conditions, development in the colder months of the year being much longer. It is probable, however, that under our conditions



Granary Weevil (*Calandra granaria*).

six or seven generations may occur during the year. The adults will live on the average from six to eight months.

The common grain weevil is too well known to need detailed description. It is a typical weevil, the head being prolonged into a snout, about three-sixteenths of an inch in length, and with four indistinct reddish spots on the elytre. Damage to the grain is caused by both the larvae (grubs) and adult weevils, but the larvae do most of the damage by feeding on the interior of the grain, although the damage by the adults is more noticeable as they make the small circular holes in the seed coat characteristic of weevil damage. Infestation of grain generally occurs after it is harvested, but maize may become infested while still standing in the field.

The *lesser grain borer* is totally unlike the common grain weevil, and the members of the family to which it belongs are chiefly wood borers. It is about one-eighth of an inch in length, dark brown in colour and almost cylindrical in form. The surface of the body is closely pitted, and the head is turned down and concealed from above by the thorax.

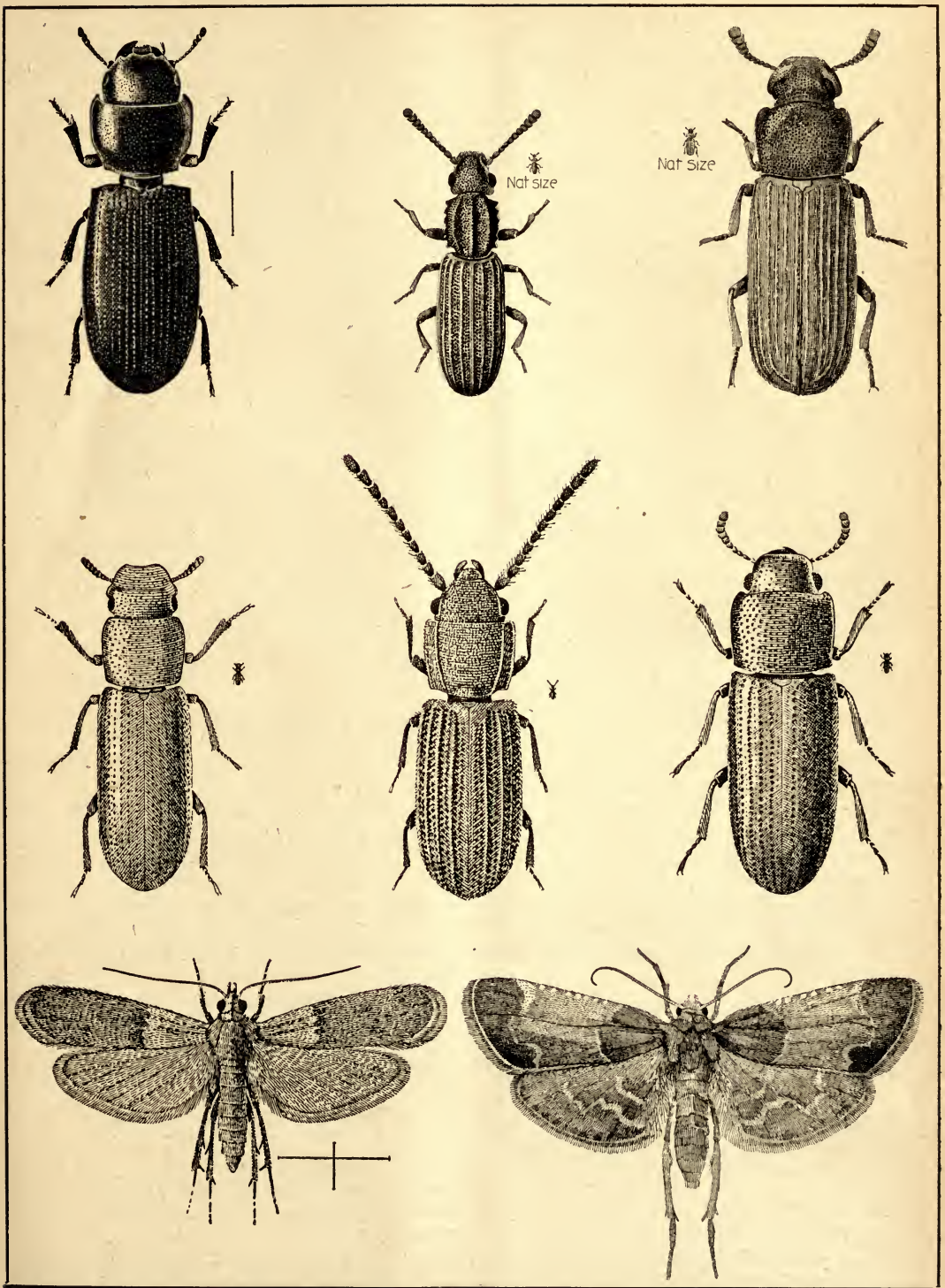
Like the common grain weevil, the adult beetle flies readily. The female lays her eggs singly and loosely among the grain. The eggs hatch in about five days, and the newly-hatched larvae, unlike those of the grain weevil, are very active and able to move about rapidly among the grains. After passing through four stages they reach their full development and change into pupae in cavities within the grain made previously by the larvae. The complete life cycle of the insect, from the laying of the egg to the emergence of the adult weevil, is from twenty to forty days under warm conditions.

Damage to the grain is caused both by the larvae and the adults. Badly damaged grain may have the whole of the starchy interior entirely eaten away, leaving the pericarps of the seed empty and riddled with large irregular holes. A large amount of floury frass also accumulates, the insects spoiling almost as much of the grain as they consume by reducing it to a powdered condition.

The damage caused by the lesser grain borer can be readily distinguished from that of the common grain weevil by the destruction of the whole starchy interior and the large irregular holes in the seed coat.

The *common grain moth* is a serious pest of maize and wheat in particular. The eggs are laid on or near the grain while in storage, but in the case of maize may be laid on the cobs while still standing in the field. When fully developed the larvae are about one-fifth of an inch in length, white in colour, but with a yellowish-brown head. When mature the larvae eat their way towards the surface to pupate, leaving only a thin transparent circular portion of the seed coat intact. This permits of the easy emergence of the adult moth. The latter is about three-fifths of an inch across the outspread wings, and varies from buff to greyish- or yellowish-brown in colour. The minimum life cycle from egg to adult is about five weeks in summer weather.

All the injury to the grain is done by the larvae. There is an impression, even among those who have been associated with the



Top Row, from left to right: The Cadelle (*Tenebroides mauritanicus*), Saw-toothed Grain Beetle (*Silvanus surinamensis*), A Rust Red Beetle (*Tribolium ferrugineum*). *Middle Row:* Long-headed Flour Beetle (*Latheticus oryzae*), Flat Grain Beetle (*Loemophloeus minutus*), A Grain Beetle (*Palorus subdepressus*). *Bottom Row:* Indian Meal Moth (*Plodia interpunctella*), Meal Snout Moth (*Pyralis farinalis*).

grain trade for many years, that the common grain moth is a stage of the weevil. This, of course, is incorrect. They are quite distinct and belong to entirely different orders.

The Origin of Insect Infestation.

There are quite a number of people who still imagine that insects in stored grain are the result of spontaneous generation, *i.e.*, that it is part and parcel of the grain itself. This also, it should be scarcely necessary to say, is incorrect. Weevil or other insect infestations in grain are the direct result of the females laying eggs in the grain, and if weevils or other insects do not gain access to it, the grain, whatever its condition, will remain free from infestation. Actually, grain becomes infested by the insects crawling or flying on to the sound grain from centres of infestation, such as waste wheat, by placing it in sheds or on sites where infested grain was previously stored, or by mixing the new grain with older infested grain. Another source of infestation is the wheat frequently left in the wheat box or hopper of the harvesting machine until the next season. This wheat becomes infested in the meantime and becomes mixed with individual lots which form centres of infestation in the new grain. Hence the need for cleaning out the wheat-boxes thoroughly at the end of each season.

The abovementioned facts are sufficient to account for the origin of insect infestation in grain, and once the wheat becomes infested, provided the conditions are favourable, the insects breed with great rapidity, and if the wheat is stored for any length of time considerable damage may result, particularly if the methods of storing are haphazard.

One of the chief factors predisposing grain to weevil attack is moisture. It has been shown that stored wheat containing less than 8 per cent. of moisture is not suitable for the development of weevil. Unfortunately, however, the grain stored under ordinary conditions contains more than this amount, and where the grain is stored in a manner predisposing it to insect attack considerable damage is sure to result.

(*To be continued.*)

Do You Know the Department's Publications?

THE Department of Agriculture has many services which are available to the primary producer—whether he is growing field, fruit or vegetable crops, raising sheep, pigs, fat lambs or poultry, or producing milk on a dairy farm—and not the least of these is the supply of literature embracing the recommendations of the Department as to the most progressive practices in all these activities.

A great deal of this literature consists of free leaflets—small publications ranging from two to twenty pages in size and dealing with very particular aspects, but a number of more complete statements are issued as Farmers' Bulletins—small books for which a nominal charge is made. Typical of the latter are:—

"Spraying," No. 72; price, 1s. 1d. posted.
"The Beginner in Bee Culture," No. 129; price, 1s. 1d. posted.
"Safeguarding Farm Stock from Disease," No. 137; price 10d. posted.
"Varieties of Maize," No. 152; price 1s. 1d. posted.
"Testing Milk and Cream," No. 161; price 1s. 1d. posted.
"Tree Planting on the Farm," No. 167; price 1s. 1d. posted.
"Varieties of Barley," No. 170; price, 7d. posted.

In addition, of course, the Department has a number of larger text-books which are sold at cost price, such as—

"The Farmers' Handbook"; price, 11s. 6d. posted.
"Poultry Farming"; price 4s. 4d. posted.
"Pruning"; price 3s. 4d. posted.
"The Dairy Manual"; price 1s. 1d. posted.

Any primary producer may obtain these sale publications by application with remittance to cover cost to the Under Secretary, Department of Agriculture, Box 36A, G.P.O., Sydney, from whom also a copy of the "List of Publications" may be obtained.



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The following are the Herd-testing Records of some of the Cows in Departmental Herds:—

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The Department has for sale young bulls from tested dams of the following breeds:—

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For further particulars apply to—The UNDER SECRETARY, Department of Agriculture, SYDNEY.



Market Demands Must Be Studied.

W. D. Kerle, H.D.A., Special Agricultural Instructor.

The area devoted to peanut growing in New South Wales is not considerable, and has not materially increased in recent years. This is probably because they can be grown more cheaply and more easily in Queensland where the climate, in particular, is much more favourable for their production. Although ample areas of light loam soil, well supplied with organic matter and suitable from that viewpoint exist in this State, the number of districts where the climate is satisfactory and where a payable crop can be produced regularly, is very limited. The chief climatic requirements are a good summer rainfall, comparatively high temperatures, ample sunshine and a dry autumn for harvesting, the section of the State which most closely approximates these conditions being the Upper North Coast district.

No profitable export market exists at present for peanuts, and they must be absorbed on the local market, which, however, is a substantial one and has increased considerably in recent years owing to the greater use of peanuts in the confectionery trade, to the popularity of products such as peanut butter, etc., and to the greater utilisation of the oil. It is essential that growers study the demands of the market and aim at marketing a high grade product, or the industry cannot be a profitable one, since the costs of production are comparatively high. The shells must be free from stain, both outside and in, the kernels well filled and plump with an absene of "pops," and the consignment well graded.

The roasting type of peanut commands the highest price. During the last few years some large areas of peanuts have been planted in Australia and in localised settlements the requisite machinery for handling the nuts in a large way has been procured for co-operative use, as for example in the Kingaroy district of Queensland.

The peanut, unlike most legumes, possesses the peculiarity of forming its seed—the nuts—beneath the soil surface. The yellow flowers are borne at the leaf axils, in the bush varieties at the base of the stems and in the runner varieties along the stems. After pollination the flower falls, leaving the stalk with a thickened end or "peg" which grows down into the soil, where it matures into a seed or nut. It is obvious that penetration of the soil by the pegs is essential and that soils of a light nature and loose surface are very desirable from this point of view.

Climatic and Soil Requirements.

The peanut will not stand frost, being susceptible at all stages of growth, and ample sunshine, moderately high and consistent temperatures, and a well distributed but not excessive rainfall provide conditions suitable for its growth. A somewhat dry autumn is necessary to enable the crop to be harvested and cured without damage to the nuts, and, generally speaking, it will be found that peanuts will do well in districts suited to the late varieties of maize. They will grow on a large variety of soils, ranging from light sandy loams to medium heavy clays, but a fertile, well-drained, light sandy loam with a good humus content, is to be preferred. Heavier soils retard freedom of "pegging," and are inclined to produce a large bulk of top growth at the expense of nut development. Nuts from coloured soils are always stained, and this detracts from their market value, although the feeding value is in no way reduced.



Peanut Plant showing Nuts in all Stages of Growth. Note also the root nodules.

Planting.

It is inadvisable to grow peanuts for more than two successive plantings on any land: for good results they should be grown in rotation with other crops. Early ploughing is essential, so that moisture may be conserved, and a fine friable seed-bed, free from decaying crop residues, weeds and large clods, may be obtained. Weed growth considerably reduces yields, and in the growing crop is difficult to eradicate; thorough preparation prior to planting will do much to reduce this work. If possible, a site comparatively free from weeds should be selected.

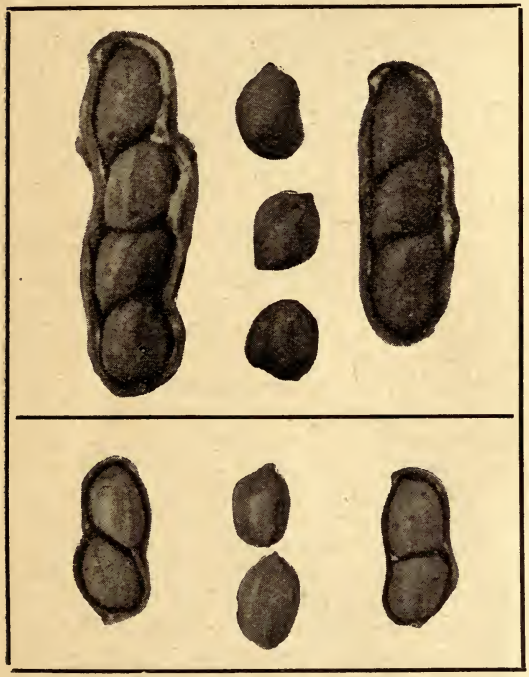
For planting, unshelled nuts, nuts broken in half, or shelled nuts (kernels) may be used. To ensure a uniform planting of only well-developed kernels and a quick germination it is advisable to use shelled nuts. The vitality of the kernels often rapidly weakens if they are damaged, and it is therefore advisable to delay shelling until a week or so before planting.

As the peanut is susceptible to frost throughout its growth, planting and harvesting during the frost-free period should be aimed at. The time of planting is in the neighbourhood of that recommended for maize, but planting should be delayed until the soil has warmed up sufficiently to induce a vigorous germination. Nothing will be gained by planting early in a cold soil. In most districts October and November plantings will give best results, although on the North Coast plantings may be made, with early-maturing varieties, until December. Usually late plantings do not yield so well as early plantings.

The ordinary maize-dropper is unsuited for planting peanuts, due to damage done to the kernels. Peanut planters and special attachments for the maize-dropper are on the market, and these operate very satisfactorily. Machine planting for a number of reasons is preferable to hand planting. For hand planting the simplest method to adopt is to draw furrows 4 inches deep with the plough at the desired distance apart, drop the seed along the furrow, and cover with a single horse cultivator with the back tine removed, to a depth of 2 to 3 inches

according to the moisture present and the soil texture.

The quantity of seed required to plant an acre will depend on the variety and partly



Above: Valencia.
Below: Small White Spanish.

upon the class of soil. For early-maturing varieties grown on light sandy soils heavy seeding is required, while runner types grown on the heavier types of soil require ample space to develop.

PLANTING Distances and Amount of Seed Required per acre:—

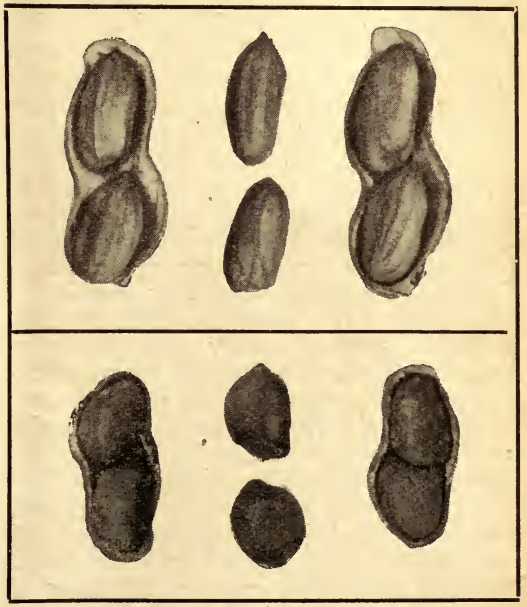
Variety.	Distance between Rows.	Distance between Plants.	Amount of Seed per Acre.	
			Unshelled.	Shelled.
	Inches.	Inches.	lb.	lb.
White Spanish ...	30 to 36	6 to 8	35 to 40	25 to 30
Virginia Bunch and Virginia Runner ...	36 to 42	12 to 15	35 to 40	20 to 25
White China ...	26 to 42	12 to 15	35 to 45	20 to 25
Valencia	36	9 to 12	25 to 35	20 to 25

Cultivation of the Growing Crop.

The necessity for cultivating the growing crop cannot be too strongly stressed. It should commence immediately the young seedlings make their appearance, and be continued until the vines have practically covered the intervening spaces between the rows. A loose, friable surface is essential so that the flower pegs may gain entrance to the soil with the least possible effort. Provided the land is free from rubbish and large clods, the first few cultivations may be carried out to advantage with a light set of lever harrows, always running across and not the same way as the rows are running. For later cultivation use a single-horse implement, and aim at gradually working the loose soil towards the plants. Weed growth is one of the greatest factors in reducing yield; therefore commence cultivation early and continue at frequent intervals.

Lime and Fertilisers.

Peanuts, like all legumes, do not thrive in acid soils, and where these occur, as they frequently do in districts of heavy rainfall, an application of agricultural lime at the rate of 8 to 10 cwt. or ground carbonate of lime at 15 to 20 cwt. per acre is recommended.



Above: Virginia Bunch.
Below: Red Spanish.

Superphosphate has proved to be the most beneficial artificial fertiliser for peanuts, applied at planting time at the rate of 1 to 2 cwt. per acre, the amount depending upon the fertility of the soil. On rather

poor sandy soils a mixture of superphosphate and bonedust in equal parts at 2 cwt. per acre, or a complete manure composed of superphosphate 5 parts, sulphate of ammonia 2 parts and sulphate of potash 1 part, applied at the rate of 1½ to 2 cwt. per acre is recommended.

Organic manures are not advisable for peanuts, unless applied to a previous crop. Farmyard manure, particularly if fresh, results in a big percentage of unfilled pods.

The value of humus in the soil from the point of view of fertility, moisture holding and bacterial activity is well known, and in the sandy types of soil the presence of this important soil constituent is of particular importance. It may be necessary, therefore, to increase the supply of organic matter in these soils by ploughing under crops such as cowpeas, velvet beans, red clover, etc.

Varieties.

Peanut varieties may be divided into two groups, namely, runner and bush types. The runner type rarely exceeds 9 inches in height, and under favourable conditions may spread to a distance of 5 feet. In most cases they are late maturing and good yielders of both nuts and forage. The bush types grow from 12 to 30 inches high, with a spread of about the same distance. They are easier to harvest and thrash, and, as a general rule, yield better on the heavier types of soil or under unfavourable conditions than the runner types. The runner type varieties are longer maturing than the bush types, the former taking approximately five months and the latter four months.

There are two distinct market requirements for peanuts, namely, for the roasting and the confectionery trade. Peanuts required for the roasting trade must conform to the Virginia type, and be of uniform size with clean white shells. To produce this class of nut they must be grown on light sandy soils. For the confectionery trade peanuts with a high shelling percentage and containing kernels of uniform size and a high oil content are required. Peanuts of the White Spanish type conform to these requirements. There are a large number of varieties, many of which closely resemble each other, while others are of little commercial value.

White Spanish.—There are a number of strains of this variety showing a fair amount of variation, and they have been classed as large, medium, and small. White Spanish is a high-yielding, early-maturing variety which readily adapts itself to a large range of conditions. It has a bushy habit of growth, and the nuts are borne closely clustered around the tap-root. The nuts are small and generally contain two light pinkish to brownish-coloured kernels, which are tightly packed in the shells. It is eminently suited for the confectionery and peanut oil trade.

Virginia Runner and Virginia Bunch.—Apart from the difference in top growth, these two varieties resemble each other very closely. Both are strong growers and produce a quantity of darkish-green foliage. The nuts are fairly smooth, of good size and shape, and usually contain two well-developed pale-coloured kernels. As they are fairly late in maturing, they need to be planted early in the season. These nuts are used largely for roasting, and are also valued by confectioners on account of their excellent flavour.

White China or Chinese is generally of the running habit of growth and is best suited to sandy soils. It is a late maturer, the nuts are large and contain two long, large, pale-coloured kernels. When grown on light-coloured soils, the nuts are clean, bright, and attractive.

Valencia.—This is a vigorous mid-season variety, having a bushy habit of growth, and the nuts are borne closely clustered around the tap-root. The pods are of medium diameter and long, and contain three or four small kernels, bright red in colour, which are closely crowded together. Valencia peanuts are reputed to be of excellent flavour and are greatly in demand by confectioners. They are also used for roasting purposes, but the pods are inclined to burst.

Red Spanish.—Bush type and strong grower, producing abundant foliage; pods small, well filled, and kernels bright red in colour, of medium size. Pods produced in clusters at the base of the plant. Yields well and contains a high content of oil.

Varieties introduced in recent years and giving promising results in field trials are:—

Maespan.—Bush type; pod very small, small to medium sized kernel of pale colour, pods well bunched at root, high oil content.

Tanah.—Bush type; medium sized nuts, two, sometimes three kernels per pod.

Toeban.—Bush type; nuts medium long and well filled, kernels light-pink in medium thick shells.

North Carolina Bush.—Procumbent spreading type; nuts large and plump, kernels large, pink and loose in thick-shelled pod.

Large White Spanish.—Bush type; nuts medium large, kernels pink and tightly held in medium thick shells.

Harvesting.

No hard and fast rule can be laid down as to the exact time to harvest the crop. The grower must aim to harvest when the vines are carrying the maximum number of mature pods. That the crop is reaching maturity is, in some cases, indicated by a yellowing of the foliage and the lower leaves dropping off. Pull up a few plants, allow to wilt in the sun, and if, upon examination, the kernels are found to be firm and unshrivelled, this may be taken as a good indication that the crop is fit to harvest. Care must be taken not to harvest too early (a common tendency among growers), for this will result in light, undersize, shrivelled kernels, while on the other hand, if harvesting is delayed, there is danger that the nuts will sprout and break away from the vines.



Peanuts being Cured in the Field on Stakes.



A Pole about 6 feet high on which to Cure Peanuts. Note the crosspieces just above the ground level.

Harvest on bright, warm days, after the dew has dried from the plants, and when the soil is moderately dry, so that any adhering dirt may be easily shaken from the roots. The vines can be harvested by hand-pulling, ploughing out with a mouldboard plough or with a potato digger. Hand-pulling is only advised on loose, sandy soils. If turned out with the plough, shake the dirt off the roots and place three or four rows together to form a windrow. Allow to lie until leaves are wilted, but not brittle and stack until cured. If it is not desired to stack, the crop may be partly cured in the field for a few days by turning the roots uppermost to the sun or placing in small cocks. When the vines have dried out sufficiently they may be carted to an airy barn to complete the process. This method is only likely to succeed provided birds are not troublesome and weather conditions are favourable while the crop is in the field.

The most satisfactory method of curing when the area is considerable is to take the

vines from the windrows and stack around poles in the field. These poles are about 6 feet high and 3 inches in diameter at the bottom end, which is sharpened so that it may be driven into the ground. Two cross pieces, each about 3 feet long, are attached to the pole at right angles to each other and one immediately above the other, approximately 9 inches above the ground level. It requires about twenty-five such poles to harvest an acre, depending on the crop.

The plants, when wilted, are placed by hand with the tops outwards and the nuts near the pole, building up firmly and evenly with the centre high and binding occasionally by dividing a plant and placing around the pole. Discolouration of the nuts and damage to the leaf result from too closely packing the vines around the pole, which causes insufficient air circulation. The time this curing process occupies varies according to weather conditions, but normally after fourteen days the poles may be transported to the barn and the cured vines taken off and stacked.

It is not advisable to detach the nuts from the plants until about six or seven weeks after harvesting when the kernels are firm and dry. If this is done too early the nuts are likely to shrivel and become discoloured, due to mould. Considerable labour is entailed in detaching the nuts from the vines. Very efficient machinery is available for picking, stemming, cleaning, grading and bagging, but their cost is too great for the individual grower. The purchase of such a machine by a number of growers in a community, and co-operative working, is recommended. For small areas, particularly with varieties of the bush type, the nuts may be detached by holding the stems and dragging the nuts across wire-netting or tightly-strained wires placed over a suitable receptacle. Winnowing is then necessary to remove the rubbish and unfilled pods. The stems and leaves, the immature nuts and refuse from the winnower may be used to advantage as food for stock.

Yields.

The yield naturally depends on soil, climate, season and cultural operations, but under normal conditions a yield of approximately 12 cwt. per acre may be anticipated. Yields considerably in excess of this are obtained under ideal conditions of soil and climate. It is reasonable to expect such returns on soils of good quality, but it is obvious that the light sandy type of soil frequently employed cannot be expected to give high yields unless the organic matter content is considerably improved by the addition of green manure crops and assistance is given by the application of suitable fertilisers.

Uses of Peanuts.

Peanuts are a highly nutritious and valuable food product for human beings and stock. The nuts, well known as roasted peanuts, either unshelled or shelled, are used extensively also for the confectionery trade and for the manufacture of oil, "butter," meals, prepared foods, etc. The oil, known to the trade as China oil, is used for salads, for the manufacture of margarine, as a lubricant and for cooking, soap-making, etc.

Nuts of the Spanish type are usually used for manufacturing purposes owing to their higher yield of oil—about 50 per cent. as against 42 per cent. in the larger Viriginia type. After the expression of oil the remainder is used as oilcake or oilmeal concentrate for human or stock foods containing about 40 per cent. protein.

The peanut bush with the nuts attached is a valuable, nutritious and palatable stock food, but when the nuts are grown for market, if they have been properly cured and the leaf retained, the tops have a high feeding value as the following analysis* in comparison with lucerne indicates:—

	Total dry matter.	Digestible nutrients in 100 lb.				Nutritive Ratio.
		Crude Protein.	Carbo-hydrates.	Fat.	Total.	
	per cent.	per cent.	per cent.	per cent	per cent.	
Lucerne ...	91.4	10.5	39.0	0.9	51.6	1 : 3.9
Peanut vine	78.5	6.6	37.0	3.6	50.4	1 : 6.6
Peanut vine with nuts	92.2	9.6	39.6	8.3	67.9	1 : 6.1

*Henry and Morrison, "Feeds and Feeding."

The yield of hay varies considerably, but 15 cwt. may be taken as a fair average.

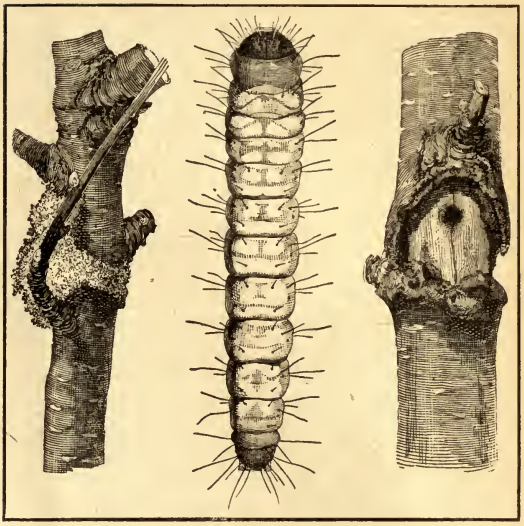
Peanuts can be very satisfactorily grazed off by pigs, but the pigs should receive other foods such as maize, etc., since the peanuts have the effect of producing a soft pork, which shrinks in curing.



Adult of Common Fruit Tree Borer.

Insect Pests and Their Control.

Notes Contributed by Officers of the Entomological Branch.



Left: Branch showing webbed material covering tunnel entrance. *Centre:* Caterpillar of common Fruit Tree Borer. *Right:* Webbed material removed to show tunnel entrance and other damage.

Tree Borers.

The Common Fruit Tree Borer.

THERE are many species of insects, including both moths and beetles, the larvae or caterpillars of which bore into and injure living trees.

The most common borer infesting fruit trees is the caterpillar of a moth, *Cryptophasa unipunctata*. This is a native species, which originally bred in wattle trees only, but now infests peaches, plums and cherries.

The eggs are laid on the surface of the bark, and the larva or caterpillar on hatching bores into the branch for a short distance and then turns downwards. The size of the tunnel is increased as the larva grows, and by the time the latter is mature the tunnel may be 4 inches in length. The larva generally shelters in the tunnel in the day time and emerges at night to feed upon the bark surrounding the tunnel entrance. The injured bark is invariably covered with a mass of gnawed wood and excrement webbed together by fine silken strands.

The larva, which is dull reddish-brown in colour and is sparsely covered with hairs, measures 1½ inches in length when mature. When fully fed, it plugs up the opening of the tunnel with gnawed wood and passes into the chrysalis or pupal stage.

The adult moth which later emerges measures 1½ inches across the outspread wings. The general colour is white with minute black spots in the centre of each fore wing. The upper surface of the abdomen is black, marked with orange.

Control.

Remove the mass of webbed material to expose the opening of the tunnel, and insert a piece of pliable wire and twist it around in the tunnel to kill the larva.

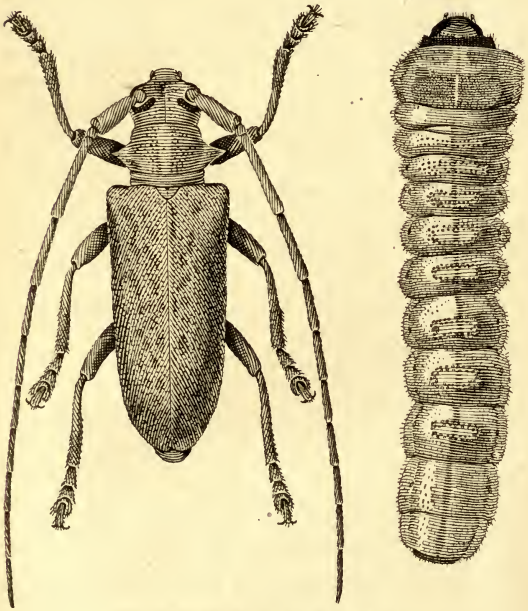
Another method is to inject a few drops of kerosene into the tunnel to cause the caterpillar to crawl out, and it can then be destroyed. Afterwards the tunnels should be plugged with grafting wax or other suitable material.

Other Borers.

There are many other species of borers which, both in the larval and adult stages, seriously injure fruit trees and are often responsible for the death of various cultivated shrubs and ornamental trees. The majority of these beetle borers belong to the

family *Cerambycidae, Buprestidae* and *Curculionidae.*

While it is known that some species will only attack trees or parts of trees which are in an unhealthy condition, there are also many species of borers which attack trees that are quite healthy.



Typical Beetle Borer and Larva.

The borers lay their eggs in the bark, and the young grubs on hatching feed for some months on the inner bark surface and on the surface of the sap wood. As the grubs increase in size they work their way deeper into the heartwood. There they pass into the chrysalis stage, and later the adult beetles emerge, the life cycle from egg to adult occupying at least twelve months.

Control.

Borers of this type are extremely difficult to control, since their presence is usually unnoticed until they have already caused considerable injury, and by this time most of the larvae are deeply embedded in the wood, and cannot be destroyed.

Where feasible, heavily infested limbs should be cut off and burned. All injured and loose bark should be scraped away and the surface should be painted with bluestone paint.

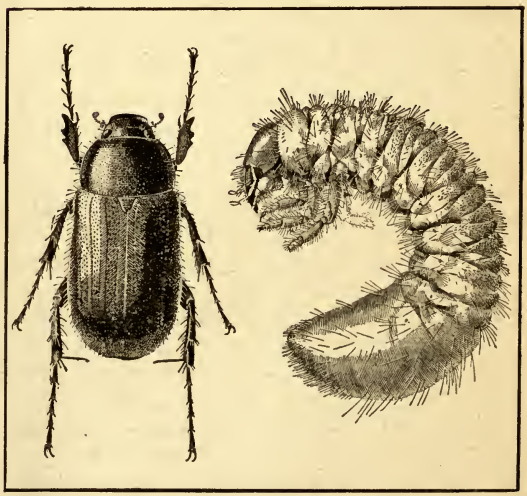
A small quantity of carbon bisulphide may be injected into the borer holes, after which the entrance to the tunnel should be blocked with grafting wax or soap. Carbon bisulphide gives off a gas which will penetrate to, and destroy, some of the larvae. This gas is highly explosive and all lights should be kept away during the treatment.

The painting of the trunks and main limbs of the trees with bluestone paint in the spring is also beneficial, as it acts as a deterrent to the female beetles and greatly reduces egg-laying. The formula for bluestone paint is as follows:—Copper sulphate 1½ lb., lime 1 lb., water 2 gallons. This paint is applied with a brush and is prepared in a similar manner to Bordeaux mixture, as described in Spray Leaflet No. 1, which may be obtained on application to the Under Secretary, Department of Agriculture, Box 36A, G.P.O., Sydney.

The Wheat Root Beetle

(*Anodontonyx tetricus*).

IN recent years some injury has been caused to growing crops by the grubs of the wheat root beetle. Both wheat and oats have at times been attacked, and although grubs have been found in light-grey soils, the only noticeable injury to the crops has occurred in red soils. Wheat growing in black soils has never been found to be infested.



The Wheat Root Beetle and Larva.

The presence of grubs in a crop is first manifested by patches showing poor growth. As the injury increases, these patches become more noticeable, until finally the young plants die, and bare areas appear in the crop resembling those produced by the disease known as take-all, with which the injury is sometimes confused.



Wheat Plants (four on the left) Damaged by the Wheat Root Beetle, with Normal Plant on Right.

The damage to the young plants is caused by the larvae feeding on the roots and gradually cutting them off to the stem. As the roots are eaten, the plants endeavour to renew them, but these new roots are destroyed and the plants eventually wither and die. In some cases when all the roots are destroyed the grubs feed upon the stem, and gradually pull the plant below the surface.

The adult beetles, which emerge mainly during the latter part of November and early December, are about two-fifths of an inch in length and are black in colour. They fly readily, and during the heat of the day, mainly during the afternoon, they cluster on fence posts, thistles, ears of wheat, etc., and in the late afternoon they fly back to shelter in the soil.

The eggs, which are spherical and measure one-twelfth of an inch across, are deposited in clusters a few inches below the surface of the soil. These hatch into minute larvae or grubs, which spend about ten months in the soil before reaching maturity. When mature the larva is a fleshy curved grub, which is nearly an inch in length. The body is yellowish-white in colour, the legs being slightly darker, while the head, which is small, is yellowish-brown. The body is covered with yellowish-brown hairs.

At first the grubs feed on the roots of weeds, and decaying organic matter in the soil, and they are about two-thirds grown when they first attack the young wheat. In the spring these grubs reach maturity and construct earthen cells from 4 to 6 inches below the soil surface, and here they pass into the pupal or chrysalis stage, and about six weeks later the adults emerge.

The injury caused by this pest is more noticeable in crops affected by drought or other adverse conditions than where the growth is vigorous. In all cases the injury has been of a scattered nature; one paddock may be considerably damaged and the adjoining ones may be almost free from attack. The pest may also manifest itself in one portion of a district and be entirely absent from the remaining parts.

Various experiments, such as the use of soil fumigants, cultivation at various periods of the year to destroy larvae and pupae, and the use of attractants for the trapping of adult beetles, have been carried out. However, at present there is no entirely satisfactory method of controlling this pest.

Springtails (*Collembola*).

RECENTLY it has been noted that springtails have become very abundant, and some injury has been caused by them, especially in moist situations.

There are several common species of springtails which infest garden soils in New South Wales, and after rain they are frequently found floating in numbers on the surface of small pools of water. The common garden forms, which may be either white or grey, are small wingless insects which vary somewhat in size, but do not exceed one-tenth of an inch in length. They

are particularly attracted to moist localities and are found in decomposing wood, leaf-mould and most other forms of decaying organic matter, which is their normal food.



Common White Springtails.

The minute eggs are laid in the soil and the young on hatching resemble the adults in general form, but are much smaller. They grow by a series of moults until finally they reach the adult stage.

They are frequently found feeding in various kinds of bulbs and corms in the soil, but generally in these cases some primary rot has first caused the injury, and the springtails are merely feeding on these rotting tissues. Under certain conditions, however, these springtails may actually attack various kinds of seeds planted in the soil or destroy the growing tips of recently germinated seed, or even attack some of the more tender growth of plants.

With the arrival of summer and the consequent drier conditions in the soil, the numbers of springtails generally decrease.

Where it is intended to plant seeds or seedlings in soil heavily infested with springtails, liming and frequent turning over of the soil will be found to be beneficial. If planted seeds or seedlings are being injured, the soil should be thoroughly watered with nicotine sulphate at a dilution of 1 part in 600 parts of water (2 tablespoonfuls to 4 gallons water). The free use of tobacco dust and pyrethrum powder on the infested soil is also helpful.

A Text Book on Banana Diseases.

THE need for a publication which brings together all the information available on banana diseases has been met by the publication of "Diseases of the Banana and of the Manila Hemp Plant," by Dr. C. W. Wardlaw. This comprehensive treatise, the first on this subject in any language, while written primarily for the plant pathologist, will prove an excellent reference work for the student and general agriculturist.

All the important and minor diseases which affect bananas and manila hemp have been treated in considerable detail, and the completeness of the volume makes a definite appeal to the reader. It is doubtful if any published paper relevant to these crops in health or disease has escaped the eye of the author in his exhaustive survey of the field.

Dr. Wardlaw does not write as a professor of banana pathology, but as one whose own investigations into many banana diseases have given him wide experience, a thorough knowledge of the disconcertingly scattered but voluminous literature and a correct perspective for the collection and compilation of available information. Reports of Dr. Wardlaw's own reseraches, chiefly into banana wilt and storage and transport diseases, form no inconsiderable part of the treatise, rendering it more authoritative.

The subject matter is dealt with in four sections: 1. Soil-borne, vascular and stem diseases, of which banana wilt or Panama disease is the most important; 2. Plantation diseases of fruit and leaf, including cigar-end, *Gloeosporium* rot and *Cercospora* leaf spot (Sigatoka disease); 3, Virus diseases, of which bunchy top is of most economic importance; and 4. Storage diseases, for precise knowledge of which we owe so much to the investigations of the author. To a very complete text is added a bibliography of 559 titles, easily the most comprehensive index to banana literature yet compiled.

The book is well printed on good paper and is unusually well illustrated with excellent text figures. Our copy from the publishers, McMillan and Company, London.

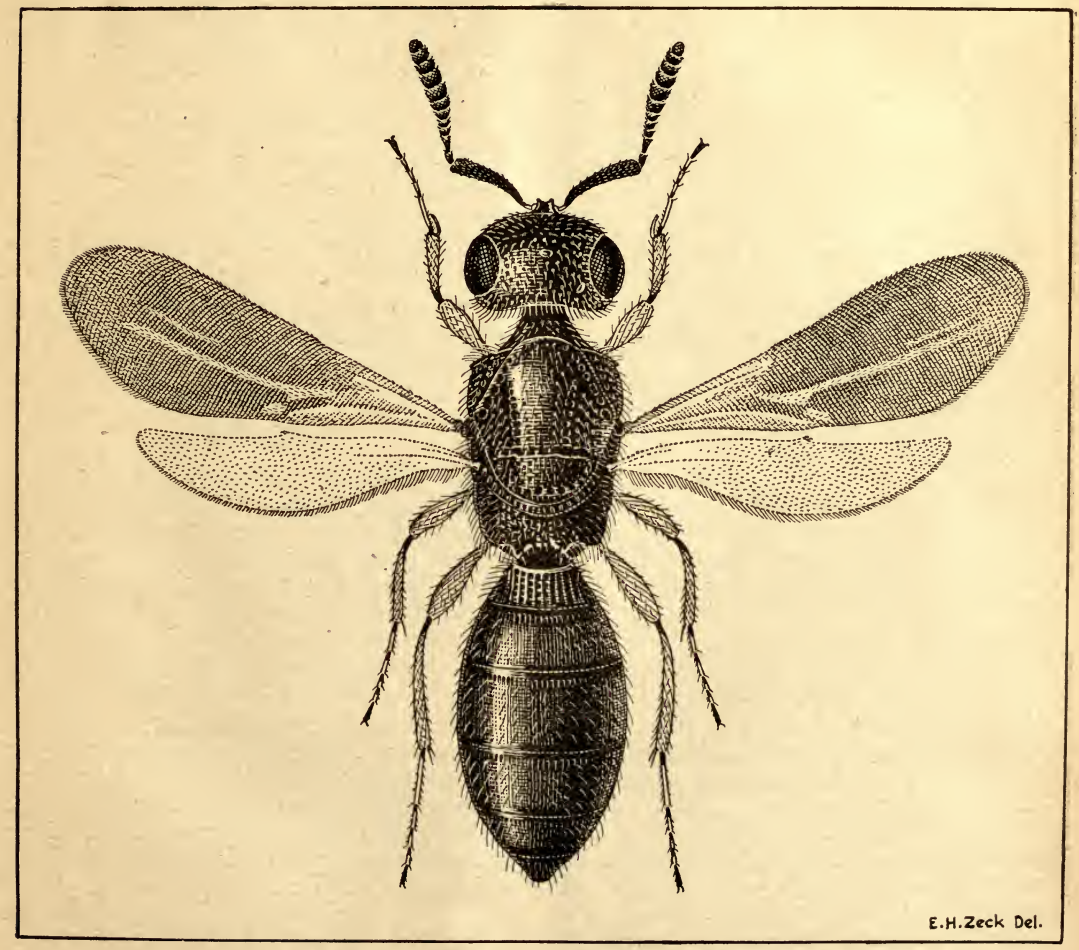
An Egg Parasite of the Plague Grasshopper.

N. S. NOBLE, M.Sc., B.Sc.Agr., D.I.C., Assistant Entomologist.

DURING the severe infestations of the plague grasshopper *Calataria* (*Chortoicetes*) *terminifera* which occurred inland in New South Wales during the spring and early summer of 1934, some time was devoted to the study of the various species of parasites which attacked them. These included a wasp parasite infesting the eggs and several species of fly parasites, and a mite attacking the hoppers.

The present article deals only with the wasp parasite, *Scelio fulgidus,* which breeds in the eggs of the grasshopper. This species, which belongs to the family *Scelionidae,* was described by Crawford[1] in 1911 and was re-described by Dodd[2] in 1926.

There are numbers of records in literature of *S. fulgidus* having been bred from other species of grasshoppers and also of other species of *Scelio* having been bred from *C. terminifera.* However, the exact identification of these species seems to have been doubtful and it is highly probable that *S. fulgidus* has only been bred from



The Grasshopper Egg Parasite (*Scelio fulgidus*). [Enlarged 25 times.]

the eggs of *C. terminifera,* and that no other species of *Scelio* has been bred from this host. During the recent plague many thousands of eggs of *C. terminifera* were collected, but *S. fulgidus* was the only parasite which was bred from them.

General Description.

The female wasp, which is shiny and black in colour, measures approximately one-seventh of an inch in length. The legs are brownish-red in colour. The antennae are twelve-segmented and the forewings are slightly smoky. The male resembles the female in general appearance, but the legs are darker in colour, the front wings are clear, and the antennae are only ten-segmented.

Distribution.

This wasp occurs in Queensland, New South Wales and Victoria. Specimens have been collected as far north as Roma in Queensland, and in New South Wales, during the past plague, *S. fulgidus* was collected from all the infested inland districts.

Percentage of Sexes.

Dodd (1926) considers males to be rare in the genues *Scelio*. Field collections of wasps invariably showed a great preponderance of females, but this may have been due to the fact that males tend to emerge before females, and live for a shorter time. Of 444 adults collected at Moree, 380 or 85.59 per cent. were females.

On the other hand, of a total of 1,717 wasps which were bred out of egg masses collected at Coolah, only 1,034 or 60.22 per cent. were females, so that in this species males are by no means rare.

Habits of Adults.

In the field the adults run and fly very rapidly. They frequently climb grass stems and also disappear into cracks in the ground.

In the laboratory they feed freely on water and honey solution, but in the field, apart from dew which might collect on dry grass, there appeared to be no other source of possible liquid food, there being practically no flowering vegetation present in most infested areas.

In jars in the laboratory the wasps mass together and will lie motionless for hours one upon the other. If soil is placed in the jars they bury themselves up to a depth of 1 inch at the side of the container nearest the main source of light. They also force their way into minute cracks in breeding cages, where many perish.

Length of Life.

One thousand newly emerged wasps were placed in a series of glass cylinders containing moist soil and were provided with honey solution. After nine days about 50 per cent. of the wasps were dead. After seventeen days only a few survived, and after twenty-one days all were dead. The last to die were all females. The species does not appear to be long lived.

S. fulgidus mates readily under laboratory conditions; pairs were seen mating in the field, in crevices.

Total Eggs Per Female.

The total eggs within five female wasps was counted with the following results:— 277, 219, 199, 263, 210, the average being 233.6, this representing the possible average oviposition.

The ovarian egg is translucent, white in colour, elongate and slightly curved, and measures approximately one-fiftieth of an inch in length.

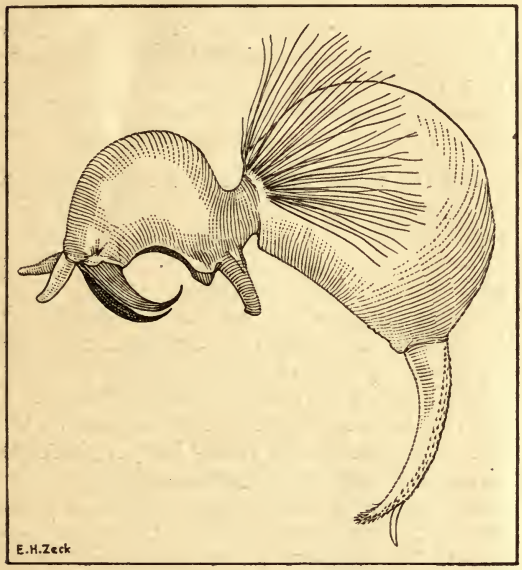
Superparasitism.

More than one parasite larva was sometimes found in one grasshopper egg, and twenty-eight first stage larvae were dissected from eight grasshopper eggs, all from the same egg mass. However, never more than one parasite larva reached maturity.

The First Stage Larva.

The first stage parasite larva is remarkable in appearance. It is unsegmented and semi-translucent, and is divided into two regions, a prominent cephalothorax and an abdominal region separated by a very marked constriction, both portions being very prominently curved on the dorsal surface. The cephalothorax bears a pair of prominent clear antennae and a pair of very stout curved sickle-shaped, heavily chiti-

nised mandibles. On the ventral surface there is also a pair of short, broadly pointed chitinous protrusions and one median truncate chitinous appendage, which is just in front of the constriction. The abdomen terminates posteriorly in an elongate appendage which is armed with short setae which appear to be chitinised. Anteriorly, each side of the abdomen is armed with a group of elongate setae. The mandibles, abdominal setae and the posterior appendages are capable of movement.



First Stage Larva. [Greatly enlarged.]

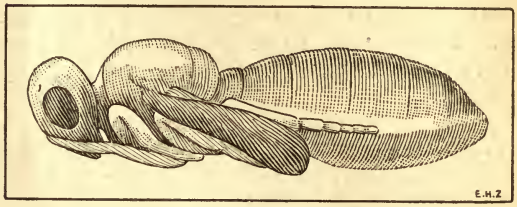
The mouth of the larva is ventral and its alimentary tract is a blind sac. No breathing system could be distinguished. The body of the smallest larva measured was one-seventy-fifth of an inch in length.

As the larva feeds the abdomen increases considerably in size and the cephalothorax and the posterior appendage become relatively inconspicuous.

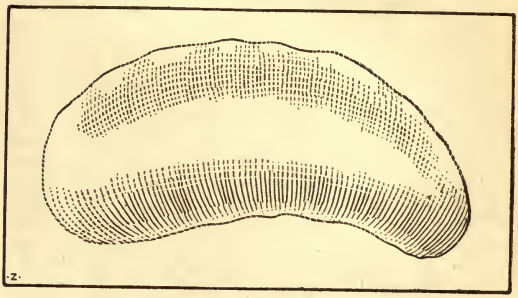
The Mature Larva.

The mature larva is greyish-green in colour, segmented, elongate, cylindrical and slightly arched, and measures approximately one-fifth of an inch in length. The integument, which is smooth and glistening, is very delicate.

The mouth is ventral and the larva possesses a pair of poorly developed, lightly chitinised straight mandibles. The respiratory system can be clearly seen as the larva approaches maturity. A main tracheal trunk passes down each side of the body and is united anteriorly and posteriorly by transverse commissures. From the main trunk short branches pass out to the spiracles on each side of the body. The spiracles do not appear to open until the parasite larva is approaching maturity.



Pupa. [Greatly enlarged.]



Mature Larva. [Greatly enlarged.]

The alimentary tract occupies the greater part of the larva and does not appear to open externally until after the larva has reached maturity.

Two well-developed convolute salivary glands are situated one on each side of the alimentary tract. These unite to a common ventral tube opening into the oesophagus.

By the time the parasite larva reaches maturity it has devoured practically the whole of the contents of the grasshopper egg. It then voids a quantity of waste matter and passes into the pupal stage within the grasshopper egg shell.

Emergence of Adults.

The adult wasp eats out an irregular hole in one end of the egg and forces its way up to the surface of the soil, emerging through a small irregular hole in the ground. Where the parasites are abundant

the surface of the ground is marked by millions of these minute emergence holes, which are in contrast to the larger circular holes through which the young hoppers emerge from the soil.

The parasites generally commence to emerge round about the time that the grasshoppers from the same egg beds hatch.

In Table 1 is set out the emergence of parasites from a square foot of an egg bed collected at Coolah on 6th January, 1935.

These eggs were deposited from 20th-22nd December, 1934. A total of 402 hoppers emerged between 21st January and 31st January, 1935.

TABLE 1.—EMERGENCE of *S. fulgidus* from 1 square foot of grasshopper egg bed from Coolah, N.S.W.

Date of Inspection.	No. of Females.	No. of Males.	Total.
1935.			
23 January ...	1	55	56
24 ,, ...	1	88	89
25 ,, ...	3	48	51
29 ,, ...	609	172	781
30 ,, ...	124	106	230
31 ,, ...	59	65	124
1 February ...	18	30	48
4 ,, ...	10	17	27
5 ,, ...	27	20	47
6 ,, ...	18	4	22
7 ,, ...	13	4	17
8 ,, ...	5	4	9
11 ,, ...	3	3	6
12 ,, ...	1	...	1
13 ,, ...	1	1	2
14 ,, ...	...	3	3
18 ,, ...	3	2	5
19* ,, ...	2	...	2
20 ,, ...	4	17	21
21 ,, ...	26	16	42
25 ,, ...	9	21	30
26 ,, ...	20	2	22
27 ,, ...	5	4	9
28 ,, ...	4	...	4
1 March	9	...	9
4 ,, ...	14	...	14
5 ,, ...	7	...	7
6 ,, ...	5	...	5
7 ,, ...	9	...	9
11 ,, ...	19	...	19
12 ,, ...	...	...	...
13 ,, ...	...	...	...
16 ,, ...	...	...	...
18 ,, ...	...	...	...
19 ,, ...	3	1	4
20 ,, ...	2	...	2

Females = 1,034; Males = 683. Total = 1,717

* Soil given the equivalent of half an inch of rain spread over a period of six hours on this date.

It will be seen from the foregoing that, though the parasites and grasshoppers commenced to emerge at approximately the same time and the hoppers only emerged for eleven days, the parasites continued to emerge for approximately two months.

A detailed record of the emergence of hoppers and parasites from portion of an egg bed from Binda was also kept.

The grasshoppers emerged for a period of ten days, while a total of 947 parasites emerged from 11th February to 23rd April, 1935—a period slightly in excess of two months, and in this case the emergence of parasites was greatest during the second half of the emergence period.

As the adult parasites do not appear to be long-lived—numbers of dead wasps were seen in the field two weeks after the first emergence—this protracted emergence period of the parasite appears to be a provision which ensures that adult parasites will be present in the field to parasitise eggs, laid by the grasshoppers which hatched from unparasitised eggs from the same egg beds. If all the parasites emerged at approximately the same time as the young hoppers hatched, then, provided the parasite is specific, which seems highly probable, the parasites would have to live for a period of about two months before these hoppers matured and laid eggs.

Dissection of individual grasshopper egg masses indicated that, at times, all stages of the parasite from first stage larvae to maturing pupae were present in a single egg mass, and that this protracted parasite emergence was sometimes due to the varying periods which the parasite passed in the larval and pupal stages.

On the other hand, eggs collected at Binda were dissected periodically from the date of collection (14th January, 1935) until the last parasite emerged on 23rd April, 1935, and yet 25th February was the last date on which any stage but adult wasps were found. During March and April hundreds of these eggs were dissected and were found without exception to contain adult parasites, which, as soon as the grasshopper egg shell was ruptured, ran actively out and flew away—*i.e.*, they appeared to be lying protected within the grasshopper eggs and were apparently ready to emerge at any time.

These observations were further strengthened by dissections from egg masses collected in a number of other districts.

Thus, at Moree on 10th December, 1934, grasshopper egg beds were inspected in which approximately 50 per cent. of the parasites had emerged. A portion of the egg bed was brought back to the laboratory, and periodical dissections until the middle of February invariably revealed only normal adults sheltering within eggs. During this



Ovarian Eggs. [Greatly enlarged.]

time the soil became extremely dry and hard. On 5th January, 1935, and again on 13th February, 1935, it was noted that hundreds of fresh wasps had emerged.

The factors which bring about this unusual emergence of adults are not clear. The application of water to dry soil containing these parasitised eggs was invariably followed by the emergence of large numbers of adults. On the other hand, adults emerged in large numbers periodically from eggs in soil which was throughout extremely dry and hard.

The Length of the Life Cycle.

From numerous field and laboratory observations it is evident that the minimum life cycle of *S. fulgidus* approximates very closely the incubation period of the grasshopper eggs, though the maximum length of the parasite life cycle may be very much longer. Factors such as temperature, rainfall and soil moisture, which influence the development of the grasshopper eggs, apparently have a similar influence on the development of the parasite.

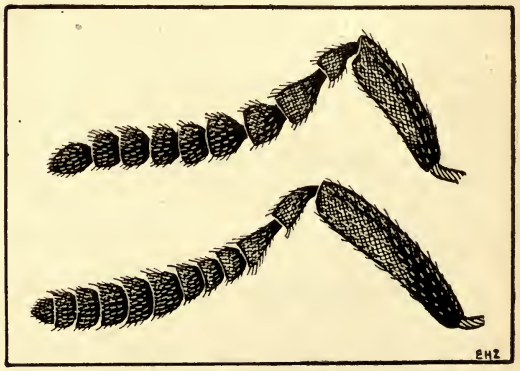
The incubation period of the eggs collected at Coolah was approximately four weeks and the minimum life cycle of the parasite was approximately the same, though the maximum life cycle was at least ten weeks (see Table 1).

At Moree, the minimum incubation period of the first summer brood of grasshopper eggs in 1934 was three weeks, and the first parasite adults appeared in the field at about the same time as the first hoppers.

At Binda, the minimum incubation period of the eggs of this same brood of grasshoppers was five weeks, due apparently to the much colder climate, and here the minimum life cycle of the parasite was correspondingly lengthened.

The eggs of the plague grasshopper, which are laid in the autumn, lie in the soil throughout the winter months and hatch in the early spring, and it is evident that the parasite passes this period within the grasshopper eggs.

Clods of earth containing hopper eggs were collected at Parkes on 27th March, 1934, and were kept in a dry condition



Antennae of Adults. [Greatly enlarged.]
Above: Male. *Below:* Female.

throughout the following winter. On 16th November, 1934, the clods were saturated with water, and on 12th December, 1934, hundreds of grasshoppers hatched, this hopper emergence being about two months later than in the field.

On 22nd and 23rd January, 1935, and again on 12th February, 1935, it was noted that numbers of adult wasp parasites had also emerged.

The exact date of egg deposition was unknown, but it is evident that the minimum incubation period of the hopper eggs was eight and one-half months, and the minimum life cycle of the parasites was approximately ten months under these adverse conditions.

As neither wasps nor parasites emerged from clods from the same area which were unwetted, it is again evident that the application of moisture to the soil containing grasshopper eggs played an essential part in inducing the emergence of hoppers and parasites.

The Spread of S. fulgidus.

During the past plague swarms of hoppers invaded districts and laid eggs in areas which had not been infested for many years, yet these eggs were heavily parasitised, and it is of interest to know how *S. fulgidus* was able to appear suddenly in such numbers in these areas.

It is possible that numbers of plague grasshoppers occurred in these areas in the previous season, but were not noticed by graziers.

On the other hand the parasites may have flown in with, or have been carried into, the new areas by the winged swarms.

Uvarov[3] states that in other parts of the world *Scelio* parasites have been observed firmly attached by their mandibles to adult grasshoppers. *S. fulgidus* has not been observed to have this habit, but it has very strongly developed mandibles, and under laboratory conditions the wasps were definitely attracted to adult grasshoppers.

The Value of the Parasite.

Although present in all infested districts, the abundance and effectiveness of the parasite varied greatly in different parts of the same district, and in different parts of the State. In parts of the Moree district in the early summer, parasites were present in countless millions and many acres of grasshopper egg beds were completely wiped out.

In other egg beds in this district the percentage of parasitism was comparatively small, and large numbers of grasshoppers hatched. Few of these hatching hoppers reached maturity, but, had they done so, there would have been a huge population of parasites ready to destroy any eggs they might have laid.

It is evident that *S. Fulgidus* is incapable of preventing the occurrence of periodical plagues of grasshoppers, but once the plagues do occur, then this egg parasite does play an important part in again reducing them to harmless numbers.

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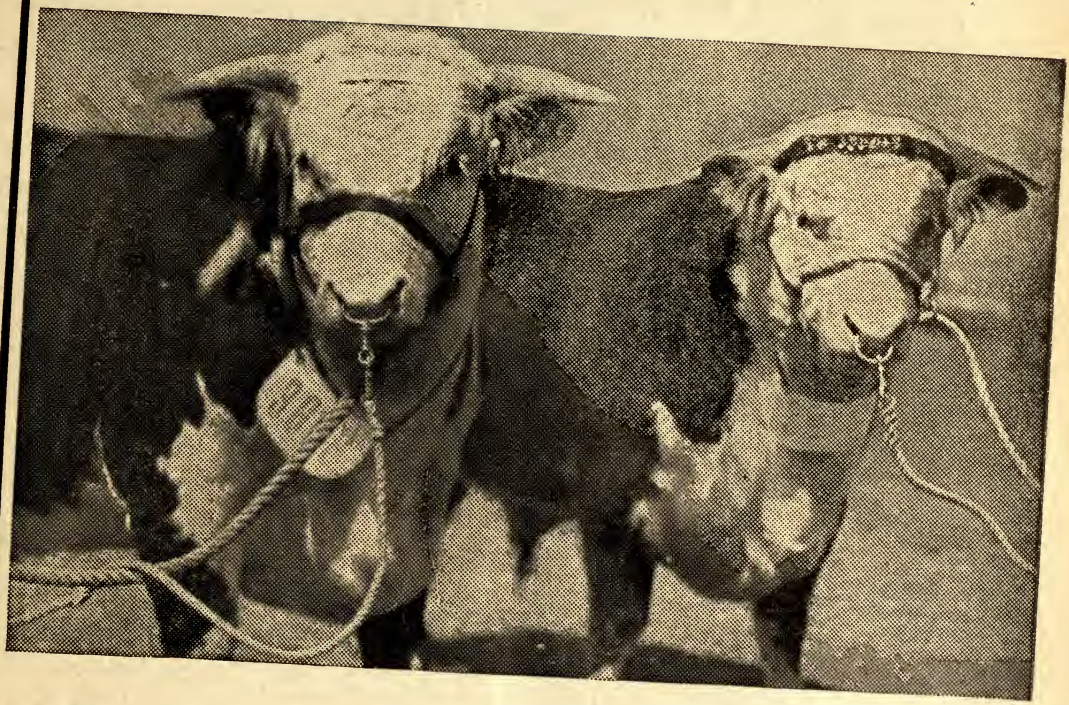
[3] 1928—
Uvarov, B. P. "Locusts and Grasshoppers." p. 114.

Farrer Place: Perpetuating the Famous Wheatbreeder's Name.

THE City Council has approved of a suggestion that the area which the Department of Agriculture building faces, and which is bounded on two other sides by portions of Bent and Young streets, be named "Farrer Place" and that the name Raphael-street be discarded.

The adoption of this name is most appropriate for the building occupied by the Department of Agriculture is the only one actually facing it and the memory of one of the greatest benefactors of Australian agriculture—William Farrer, the noted wheatbreeder—whose work has resulted in incalculable benefit to the wheat growing industry not only of New South Wales but also of Australian will thus be perpetuated.

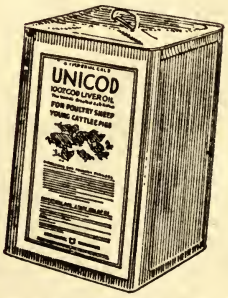
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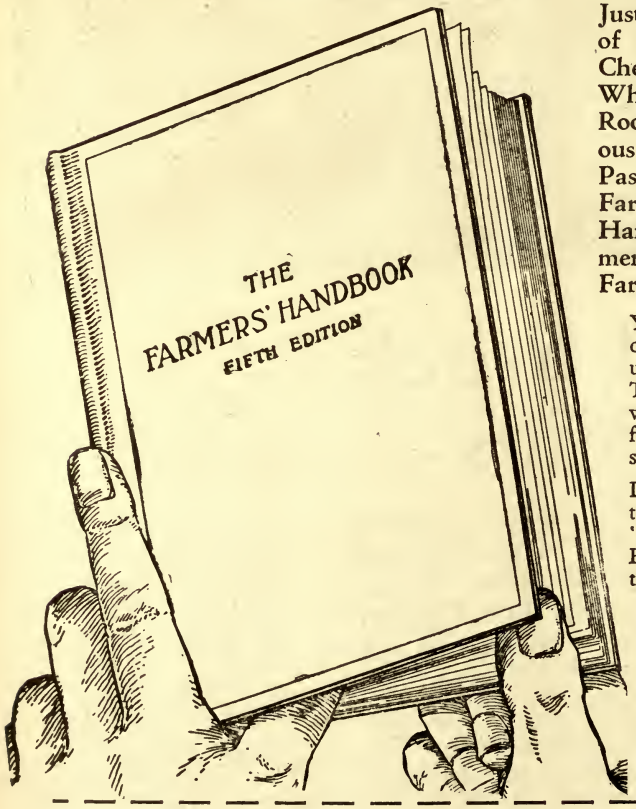
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There is Always a Cause of Second-grade Cream.

There is always a cause of inferior quality in cream—sometimes easy to find, at other times more obscure, but in very few cases is it impossible to discover the reason for it. Contrary to the belief of some, the factory grader does not class as "second grade" if it can be avoided.

The two main points for consideration are, first, how to prevent milk becoming contaminated, and, second, how to prevent development of bacteria which may have gained entry to the milk.

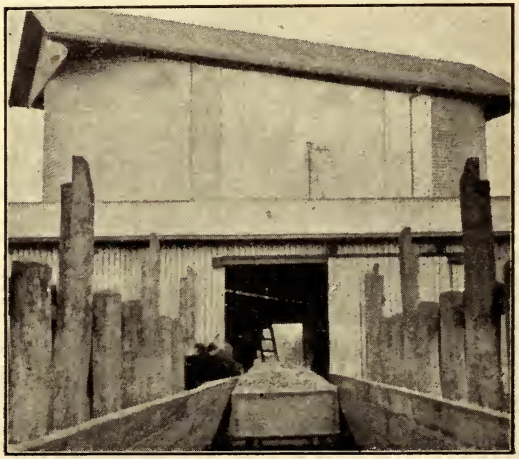
The Department's World-famed Jerseys.

Speaking recently of the valuable services rendered the farming community and the State by the Department of Agriculture, Mr. A. H. E. McDonald, Director of Agriculture, instanced the breeding and distribution of high-class Jerseys from Hawkesbury Agricultural College.

The College herd, he said, was one of the most famous Jersey studs in the world. Of the twenty-two Jersey cows in New South Wales which had produced more than 1,000 *lb. commercial butter in* 365 *days, twelve of them belonged to the College stud.*

How Bacteria Enter Milk.

Bacteria may enter the milk in several ways. Large quantities may be in (1) the lower part of the teat, and these are usually associated with cow-dung, dirty water, etc., and are very harmful. Other sources are (2) dirt from the cow's udder and sides; (3) the milker's hands and clothes; (4) unclean buckets; (5) dirty or dusty yards and bails; (6) unclean straining cloths; (7) unclean separators; (8) unclean separating or cream room and surroundings; and (9) unclean cream cans.



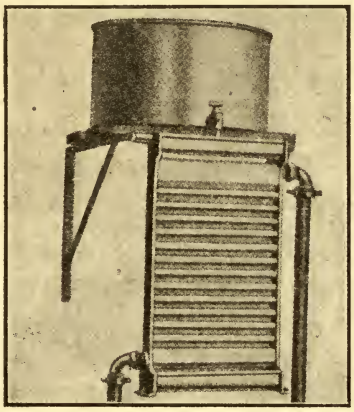
An Excellent Arrangement.
Twin silos, feed shed, a double row of feeding stalls with a truckway between to facilitate feeding.

(1) The first source of contaminataion in healthy cows is the teat. It is therefore advisable to discard the first milk from each teat, which in any case is not rich in fat.

(2) Cow's udders and flanks should be brushed, if dirty, and then wiped with a wet cloth. This has the effect of removing any dirt, and the damping prevents a large amount of dust, etc., from falling into the bucket.

Clean Hands.

(3) Milkers' hands should be washed after the milking of each cow. This prevents dirt accumulating on the hands, minimises the danger of carrying disease from one cow to another, and also lessens the chance of milkers getting sore hands. Water used for this purpose should be changed frequently.



A Milk Cooler.

(4) Buckets can only be considered clean when they are free from all bacterial life, and have been properly cleansed and scalded since last using. The slightest trace of any dried milk or grease means that considerable bacterial life is present, usually of a harmful nature.

(5) The bacteria which live in dung, etc., are, as mentioned before, particularly objectionable in milk, and among them are found most of the organisms which cause fermentation and decomposition; therefore, the freer the yards and bails are kept of manure, the less chance of infection from this source, as the slightest breeze may lift the dust and deposit numbers of bacteria in the milk. A lot of infection from this source can be prevented by keeping all cans covered and on the windward side of the bails, always remembering also that the milk must be kept free from the contaminating smell of urine, etc. If water is available the bails and yards can be washed down after each milking; contamination from this course will then be practically nil.

Unclean Milk Strainers.

(6) Although nobody would argue against straining milk, nevertheless, if the operation is not done properly, it may itself be the cause of much trouble. An efficient strainer should remove as much foreign matter as possible from the milk; it should be large enough, and it should be easy to clean. With regard to cleaning, all strainers should be free from grooves, etc., which might collect milk, and it is more satisfactory if the gauze can be removed for washing. If materials such as cloth or lint are used it is absolutely essential that these shall be burnt after each

Feeding Whey to Calves.

WHERE dairy farmers have to supply milk to the cheese factory the question of feeding whey to calves arises. Calves do well on whey and soon grow to relish it. The principal points to be observed are as follows:—

1. Break-in the calf gradually to drinking whey after having been started on milk. The same process as in the case of skim-milk should be employed, but care must be taken to boil the milk to prevent it coagulating when mixed with the whey.

2. Guard against bloat caused by too high an acidity in the whey.

2. See that too much water has not been added to the whey to reduce and retard acidity when cooking the curd.

4. Provide a good well-boiled porridge to be added to the whey.

As it will necessarily be some time after the whey is drawn from the vats before it is fed to the calves, the progress of acidity should be checked by boiling the whey. The use of molasses with whey is also recommended.

milking, otherwise they are often a fertile source of infection.

(7) An unclean separator or a separator which is not washed after each using is another source of infection, and in this case the infection will consist of live virile organisms. As the modern separator is so easily cleaned, and in the majority of cases free from any corners, etc., and can all be boiled after use, it should be the least cause of trouble.

Good Drainage and Ventilation.

(8) The separating or cream room should be so constructed that the floor drains quickly, and both the floor and at least some distance up the walls are quite impervious to moisture. It should be free from any acute corners, so that it can be easily flushed out each day with boiling water. Very many troubles in milk and cream, which are otherwise well looked after, can be traced to bacteria breeding in cracks in floors and walls, etc., of separating and cream rooms. Good ventilation is essential in cream rooms. No wet bags or cloths should be allowed to remain about, as they are a harbour for mould growths, etc. The room should also be guarded against any infection from pigs, fowls, ducks, dogs, etc.

(9) In many cases the cream cans are a very fruitful source of contamination, and care should be taken that only rustless and seamless cans are used, and that they are thoroughly washed and scalded with *boiling* water and allowed to cool and thoroughly drain before any cream is put into them. Petrol tins, which are often used for storing cream, are a very grave source of infection, chiefly on account of the cream which collects in the seams. This trouble can be minimised by having the seams filled with solder before using, but a tinned steel, seamless bucket or can is preferable.

Additional Precautions Necessary in the Warmer Months.

With the approach of the warmer months the dairy farmers' difficulties increase enormously, for our summer temperatures and conditions are so favourable to bacterial growth that additional precautions are essential if quality is to be maintained.

The low temperatures experienced during the winter months are generally of great assistance in the maintenance of cream quality; but therein lurks trouble, for the carless farmer is apt to think that the indifferent methods that stood him in good stead in the colder months will continue to see him through in the summer. They will not.

Importance of Cooling.

The first step towards controlling the action of bacteria in milk and cream is to prevent such organisms as have gained access to these products from multiplying to sufficient numbers to cause trouble. The only way to do this is to cool the milk or cream as much and as soon as possible. In a climate such as ours, this is one of our biggest troubles.

In the absence of water being laid on to the separating room, any of the small water-bag coolers, to cool the cream straight from the separator or the milk immediately it is drawn, are very efficacious, as every degree of temperature we bring the product below 80 degrees Fahr. will have a retarding effect on the bacterial development, and in many cases (in relation to weed taints, etc.) the aeration will improve the flavour. If a cooler is not available a lot can be done by standing the milk or cream cans in cold water, or putting wet bags round them, but it must always be remembered that fresh water is advisable each day, and the bags should be changed each day and allowed to dry. In the case of cream it should be stirred with a tinned metal stirrer two or three times each day, and not be mixed until each lot of cream is cool. Finally, it should be delivered to the factory daily, if possible.

The production of first-grade cream means:—(1) Thorough and systematic cleanliness; (2) keeping the temperature of the milk or cream as low as possible; (3) delivering the cream to the factory as soon as possible.

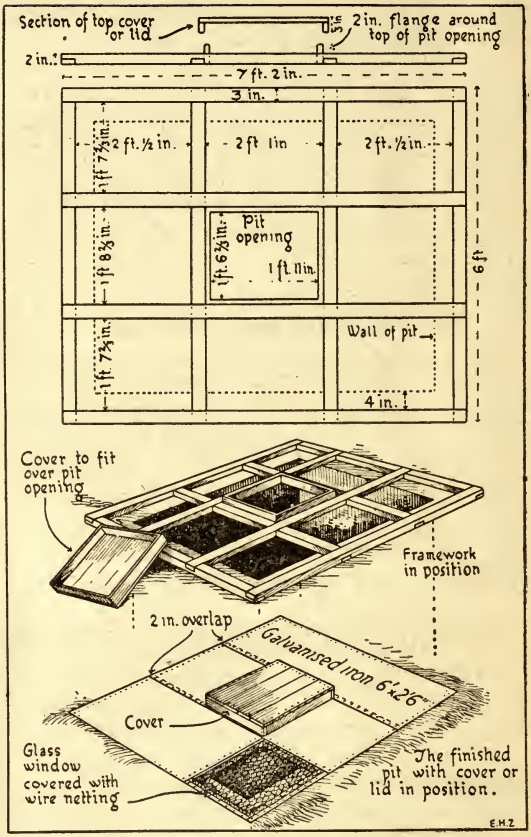
With reference to the delivery of cream, many people, after taking as much care as possible on the farm, allow the product to become heated in transit to the factory, either by not having a well-shaded stand or, when they do the carting themselves, by not taking the trouble to keep the cans covered (by, say, clean wet bags). This neglect may very often be fatal to quality, particularly in the summer months.

A Waste Fruit Pit.

For Fruit-fly Control.

In the control of fruit fly the destruction of all waste and infested fruit by burning, boiling, or placing in an insect-proof pit is compulsory under the Plant Diseases Act. Growers, therefore, are strongly urged to commence construction of a pit immediately, so that it will be ready for use by the time harvesting of summer fruit begins.

MANY fruits, pome and stone fruits in particular, are difficult to burn and require a large quantity of firewood, which is frequently difficult to obtain. In addition, the fruit is often incompletely burned, particularly around the edges of the heap and numbers of maggots escape from the fruit to pupate in the soil.



One Style of Cover for Waste and Fly-infested Fruit Pit.

Advantage of a Pit.

In dealing with large quantities of waste fruit, boiling may prove to be a lengthy job, and, where firewood is scarce, a costly one also. An insect-proof pit has none of the difficulties associated with burning or boiling, and its use is strongly recommended to growers as presenting the most efficient, convenient and economical means of dealing with waste and infested fruit.

Many of the pits now in use are about 6 feet by 6 feet and 6 feet deep, and one of this size, when full, will hold approximately 150 bushels of waste fruit. The size of the pit, however, will depend on the requirements of each orchard.

Suitable Pit Covers.

Two types of pit cover are used. The one consisting of a hardwood framework covered with galvanised iron (see illustration) is recommended for preference, as it can be easily removed to a new pit site if necessary. The other type of cover consists of logs of about 6 inches diameter placed close together and parallel and covered with a layer of soil well consolidated to a depth of about 6 inches. Both types of cover extend beyond the edges of the pit, and the soil is well banked up to make the structure insect-proof. In the centre of the cover is an opening, usually about 2 feet by 1 foot 6 inches, through which the fruit is dumped. This opening is covered with a tightly-fitting lid.

In one corner of the cover, and at least 2 feet from the opening, is fitted a glass window, having a surface area of at least 36 square inches, and protected with wire netting. This permits the light to attract the flies away from the central opening and considerably lessens the chance of any escaping when fruit is being dumped.

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September in the Orchard.

C. G. SAVAGE and R. J. BENTON.

Seasonal Cultural Operations.

AT this period of the year fruitgrowers find themselves with many jobs on hand, but ensuring that the most favourable conditions are provided to induce satisfactory growth of tree and fruit is perhaps the most important for this month.

Provide Good Soil Conditions.

The weather will normally become increasingly warm, and with the possibility of a number of westerly winds, there is the likelihood of loss of soil moisture. Contrary to the past two seasons experienced on the coast, the rainfall has been much below the average, and, in addition, most of the rain which has been received, fell in January and February. There are, therefore, a number of orchards where the preparation of the soil by thorough ploughing has not been possible, and lack of aeration combined with the probability of most of the plant food being near the surface will tend to induce root feeding nearer the surface than is desirable. Where this thorough soil preparation has not already been carried out it should be performed at the earliest opportunity.

A very fine tilth is not desirable in most places, a surface of small clods being preferred. Weed growth is thus given less encouragement, rain penetration is facilitated, and there is less tendency for compaction of the soil. On undulating situations, occasional thunderstorms may result in soil erosion and provision should be made for the prevention of such loss by forming sufficient shallow drains to carry off gradually the surplus water.

Pruning Citrus Trees.

The orange crop with the exception of Valencias will now be nearly finished, and the occurrence of a "bare tree" presents a very favourable opportunity for any necessary pruning. Many low-lying branches may need removing, and growers should aim at a foliage clearance of about 1 foot from the ground; on young vigorous trees even a greater height is desirable. Fumigation and spraying operations cannot be completely effected unless there is ample clearance from the ground, and where dicky rice weevil is present the trees should be pruned up carefully.

Strong-growing centre limbs in all citrus trees, but particularly in lemons, should be suppressed, the encouragement of a more open centre being desirable to facilitate fruiting, harvesting and spraying operations.

Mandarins will respond to a good thinning out generally of limbs and laterals. Especially should these trees be thinned when it is anticipated that next year's crop will be a good one. The fruit will be greatly increased in size as a result and there are



Orange Tree Cut Back to force out New Shoots Preparatory to Budding.
Note the nurse limbs left on the tree. These should be in such positions that they are not able to make vigorous growth.

some indications that maturity is hastened. The latter aspect is of considerable importance in localities subject to severe frosts.

The removal of dead and spent wood can be accomplished at any time of the year as opportunity offers, but thinning as above stated should not be delayed.

Many citrus growers have experienced much damage to their trees as a result of frost injury during the winter. Such trees will now be making growth below the portions killed. When the growth is fairly general along the limbs, pruning off the portions injured is advisable.

In locations where growers have previously suffered frost injury, with a repetition of damage during the past year, serious consideration should be given as to the advisability (if citrus production is being continued) of reworking the varieties affected to those of earlier maturity.

Inferior Strains and Non-profitable Varieties.

Though it is impossible to produce fruit of a standard quality unde. varying environmental conditions it is imperative that greater standardisation of varieties should be adopted. Unpopular varieties as well as inferior strains should be eliminated, and just now is the most suitable period of the year to commence this reconstruction. Trees in a weak condition cannot be reworked satisfactorily and they must either be brought to a more thrifty state or be grubbed out.

If reworking is adopted, reheading at once is advisable to ensure vigorous growths being forced out, into which buds may be inserted next autumn. Wounds made should be disinfected using Bordeaux paste or Stockholm tar.

During the following months a limited number of growths only should be permitted. The trunk and arms of the original tree should be protected by whitewash or other cover against sunburn.

This month will not be too late for grafting unsuitable varieties of pome fruits, if dormant scions are available. The opportunity should not be postponed for another season of reducing the number of varieties, for long lines of standard varieties are a most important means of increasing efficiency and economy in distribution.

Details of grafting practice were given in these Notes last month.



Three Years' Growth of Washington Navel Worked on to 17-year-old Emperor Mandarin.

Citrus Trees May be Planted.

With the risk of severe frosts almost gone and milder days in sight, the work of planting citrus trees can be undertaken. On receipt of the young trees it is a good idea to grade them according to the diameters of

the stems, planting the most backward trees in a row by themselves in order that they may be given additional attention as regards hand watering, shelter, etc.

Prior to planting cut off all the leaves. This will retard transpiration and consequently help the tree to become established more rapidly. After placing the young tree in the hole, spread out the main roots and partly fill in the soil, then give a watering, after which the rest of the soil can be filled in. Be sure to keep the bud union a few inches above the ground level, and protect the stem to within 6 inches of the head by wrapping with several folds of newspaper.

Marketing Late Valencia.

A very good crop of Late Valencias is being produced on coastal trees, whilst inland crops are somewhat lighter. The fruit is very variable in its size—some groves producing well-sized fruit, but in many others the fruit is very small.

Provided the small fruit can be allowed to hang on the trees without deterioration, and rain occurs, some increase in size can be expected. Some assistance could be given heavily-laden trees by thinning the smallest-sized fruit.

The market for large-sized fruit will probably be keen, hence the harvesting of the largest fruit at each picking will be advisable for most growers. This prevents large-sized fruit from becoming too gross and aids increased sizing of the small fruit on the trees.

Banana Planting May Commence This Month.

DURING this month banana planting will be under way, and the following notes on the subject from the pen of Mr. H. Eastwood, Senior Fruit Instructor, will be of interest to intending planters.

Avoid Soil Washing.

The square system of planting is generally popular, but with bananas the hexagonal and contour systems have advantages over the square system, and they are deserving of more consideration from growers than in the past. These systems assist the control of soil washing more than square planting—and this problem is yearly becoming more serious to banana-growers. Except in country not prone to washing the valuable top soil is eventually deposited at the bottom of the plantation or is sometimes washed completely off the area. This damage is well nigh irreparable, and perhaps no other single factor adversely affects well-situated plantations to the same extent as does soil washing.

[An article on contour planting of bananas will appear in the October issue of this *Gazette*.]

Plantations on sloping or rough land are usually laid out with sighting sticks and a measuring tape or stick with the aid of keen eyesight. Where it is possible to use a plough, furrows can be made the required distances apart both ways, or if ploughing is possible in only one direction then the measuring stick or tape can be used along the furrows.



Twin Bunches of Bananas on a Single Stem.
This very rare occurrence happened at North Tumbulgum, on the Tweed.

Provision for paths, slide tracks and roadways should be made before or during planting; otherwise later on, it may be

necessary to dig out stools and in other ways do extra work to make these improvements.

Depth of Planting.

Depth of planting depends to some extent on the nature of the soil and subsoil. If bananas are planted deeply they are slower in growth and suckering, and production is retarded, but the plantation usually lasts longer. With shallow planting the reverse is often the case, but the stools come to the top of the ground more quickly. Advantage can be taken of this by digging a hole, say 15 to 18 inches, in good deep volcanic soil, but only 10 to 12 inches in tighter soils which have a stiff subsoil near the surface, and not less than 12 to 15 inches in diameter.

Placing the Sets.

In planting place a few inches of good top soil in the bottom of the hole, put the bulb in position, and cover with top soil to a depth of 2 or 3 inches. Next break in the sides of the hole to cover the plant another 2 or 3 inches, and then tramp the soil down firmly.

On no account should the young plant be covered to the full depth of the hole in which it is planted, but a depression should be left around the plant. By following this procedure the plant is actually put fairly deep in the ground, which provides for it growing out of the soil subsequently. On the other hand, the plant is not covered deeply with soil which allows it to grow vigorously and sucker freely. As time goes on, the basin left around the plant when planting will gradually become filled in by soil washing and cultivation operations, and this delays the plants growing out of the soil.

When planting on new land which previously supported timber and undergrowth it is desirable to remove all the roots of stumps, etc., from the neighbourhood of where the plant will be "set" by digging larger holes than is usually the practice to prevent the possibility of corm or dry rot attacking the plants.

If artificial fertilisers are applied at planting they should be thoroughly mixed with the soil in the hole to prevent any likelihood of the concentrated manures coming in direct contact with and burning the suckers.

Growers Must Fight Bunchy Top.

There was an increase of bunchy top disease in at least one of the main banana-growing districts last season. Although growers may not be in as good a position financially to fight this disease as in past seasons, their position will only become worse should they neglect to do so. Once bunchy top gets a certain hold on a plantation it is most difficult to stop its rapid progress, whereas if it is prevented from making inroads in the beginning, it is easily controlled.

Many are Unfamiliar with the Disease.

This virus is not difficult to detect, but it is surprising how many growers are unfamiliar with the disease in its early stages. Less damage is likely to be done, both individually and collectively, if growers would admit that they are not conversant with the disease in any of its stages. Inspectors would then fully explain the symptoms and characteristics of bunchy top, and growers would then be able to diagnose it afterwards and handle it competently. Those growers who pretend they have the knowledge are only deceiving themselves and subsequent events sometimes reveal a spread of disease in their plantations, as in practice they are unable to detect it.

Measures for Control.

Bunchy top will become more active this month, and during the summer it will spread rapidly if not attended to.

It is again necessary to emphasise that when the disease is found the whole stool should be thoroughly sprayed with kerosene to kill all the aphids. Then it should be dug out of the ground completely and cut up in such a manner that no further growth will appear from any portion of the stool. Spraying stools surrounding diseased ones with a contact insecticide will check the spread of aphids and so minimise the risk of further infection. Nicotine (40 per cent.) or kerosene emulsion are suitable sprays.

Burning the hole from where a diseased stool is removed, and also the plant, if practicable, are further precautions which give good results. After spraying with kerosene, some growers light the trash on the stool, and with the assistance of the oil already applied the fire runs over the stool and this further minimises the possibility of any aphids escaping.



Spring Management in the Apiary.

WITH the extension of brood rearing which may be anticipated during this month, the more progressive colonies of bees in the majority of districts will be showing signs of building up in population—an important aspect of spring management in the apiary. Following winter, and until such time as young bees are raised in sufficient numbers to replace natural losses of old ones and the colony is well round the corner to spring progress, the beekeeper is always prone to some anxiety. Proper early spring management is of great importance, and every effort should be made to bring all colonies on to a firm footing, for once this stage is attained it will take very adverse conditions to bring about any serious colony losses during the main portion of the active working season to follow.

Value of Ample Stores.

Bees generally consume only small quantities of honey during the winter, but during spring, with brood rearing being extended, it is surprising how stores disappear. It is in feeding the young larvae that the food supplies are used up, and the beekeeper must see that they do not get low, or the colony may be induced to economise by cutting down brood rearing. It will need all the young bees it can raise just now.

This season most colonies carried heavy stocks of honey through the winter, and it will be more a matter of equalising stores by removing combs of honey from heavily stocked hives to those that have used up their stores more rapidly than of general artificial feeding. Before any equalisation of stores is carried out an examination of the apiary should be made to make sure that it is free from brood disease. For such an examination the weather must be fine and warm and the bees showing good



A Serious Raid by Robber Bees.

spring activity. Care should be taken to prevent any tendency to robbing, for the honey flow will not be heavy enough just yet to keep the bees fully occupied in field work. Do not leave honey exposed. Should robber bees become troublesome it would be advisable to suspend operations for the day.



Culling out the Combs.

Stimulating the Smaller Colonies.

In practically every apiary following the winter there are a number of smaller colonies which need encouragement to get them to push ahead. It is advisable to stimulate these by feeding every day or so with combs of honey from other hives. Place one on each side of the cluster, and every couple of days uncap a few inches square of the sealed honey. In moving this honey the bees will be stimulated to make the best of brood rearing, and they will be comfortable and contented with good walls of honey on each side.

When there is not sufficient honey in the combs to spare for feeding, the backward colonies may be stimulated by feeding slightly thinned down honey or sugar syrup inside the hive. Specially constructed feeders may be purchased, but for this temporary stimulation small tins or jars could be used with some strips of wood in them extending over the sides, to prevent the bees getting drowned. To make room inside the hive for the feeder remove a couple of frames from towards the side, not disturbing the cluster of bees.

Culling Combs.

During the spring there is an opportunity to remove any undesirable combs before the activity of the bees extends over the hive. Such combs are those with too great a percentage of drone comb in the brood chamber, damaged ones, and old thick ones with distorted cells not suited to brood rearing or honey storage. The discarded combs should be replaced from selected ones carried over from the autumn, or secured from hives where more than necessary accommodation for the bees in them is found.

Provided conditions are progressive enough for the bees to secrete wax freely, frames with full sheets of comb-foundation may be used to replace the culls. The discarded combs should be melted up promptly to prevent wax moth infestation.

Absconding Swarms.

It is rather alarming to the young beekeeper to have a few small to medium sized colonies become discontented during the spring, and leave what appears to be a comfortable home for no apparent reason.



Supplying a Small Colony with Stimulative Food.

It seems difficult to account at times for this absconding, which generally follows rainy weather or cool changes.

It seems that bees eager for progress get discontented because of setbacks to brood

rearing brought about by unfavourable weather conditions, but most trouble is experienced when there is a shortage of stores in the hive, the bees living hand-to-mouth, as it were. If the bees are returned to the hive and supplied with a good frame or two of honey, and given stimulative food for a time, the colony usually settles down.

Only odd colonies seem to get this discontented fit, and the larger beekeeper with experience is not greatly concerned, but for the beginner with a few hives it means a real anxiety. Keep the small colonies comfortable with ample stores, stimulate them, and thus minimise risk of absconding.

Dwindling Troubles.

In a few districts there is likely to be some spring dwindling, particularly where bees have wintered in large hives and the honey above the cluster of bees has been neglected and has absorbed moisture, resulting in yeast development. Bees will deal with this deteriorated food supply at this time of the year and stomach troubles may occur. The vitality of the bees is lowered and they become liable to infestation with the parasite *Nosema apis*.

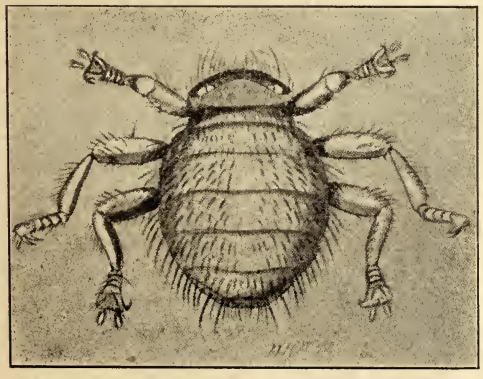
Treatment consists in making the colonies comfortable and compact, then stimulating them for a week or so with warm sugar syrup. It is important, too, that the breeding of the affected colonies be changed by the introduction of young Italian queens raised from a vigorous strain. Many colonies show immunity to dwindling troubles and *Nosema* disease, hence the importance of changing the breeding to minimise risk of inherent weakness.

Comfortable conditions, a change of food, and stimulation do much to raise the vitality of the bees—an important factor in overcoming both dwindling troubles and the disease mentioned.



Bee Louse on Thorax of Honey Bee, indicated by arrow.
[From the *American Bee Journal*.

The Bee "Louse" (*Braula coeca*).

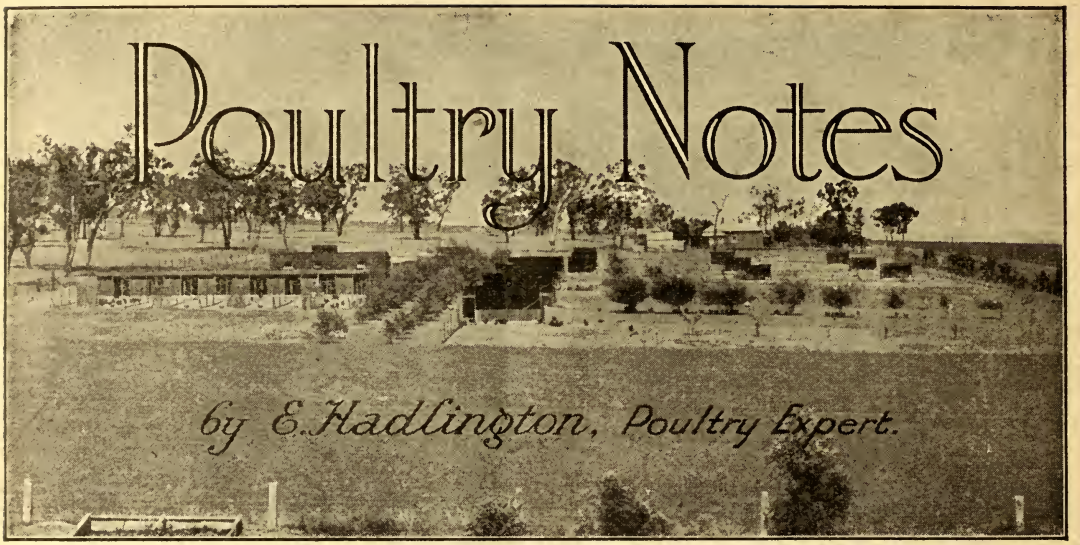


Braula coeca, the Bee "Louse," greatly enlarged.
[From the *American Bee Journal*.

BRAULA *coeca* (pronounced "seeka") is a well-known pest of the honey bee in some European countries, but so far we have no evidence of it getting through to the mainland of Australia. In co-operation with the Commonwealth Government, each State Department of Agriculture conducts a strict examination of imported bees, not only to prevent the entry of the pest referred to, but also any other pest or disease.

Braula coeca has been introduced to the United States and to as near to us as Tasmania, but we have heard so little of it of late years that it evidently did not find a sufficiently favourable breeding ground for it to cause much concern. It is not a true louse (a blood-thirsty parasite), but rather,

(*Continued on page* 536).



Management of Chickens.

BY the end of this month the hatching season should be finished. In fact, it is desirable that operations be concluded a week or two earlier if at all possible, especially where the chickens have been run over the same ground all through the season. It is only where fresh ground is available on which to run the later chickens that those hatched after the end of September are likely to prove satisfactory.

The chief concern of all poultry farmers at the present time should be to see that the chickens are receiving the best possible conditions and that no overcrowding is taking place. It should be remembered that, as the weather warms up, any overcrowding of the equipment will cause more trouble than during the colder weather, and the chickens require more ventilation.

Grade the Chickens.

Another matter which does not receive sufficient attention on many farms is the grading up of the chickens according to size. It will always be found that there are some chickens which do not develop as quickly as others, and these, if left with the larger birds, do not have a chance to grow as they would if separated. For this reason an occasional grading up is advisable during the brooding stage, and when the chickens are to be removed from the brooders it is more important still that only those of approximately equal development should be moved, otherwise the smaller ones are likely to be overwhelmed by the others, thus causing losses.

Again, as soon as the cockerels are showing up prominently it is a good plan to separate them from the pullets.

These are little points which make a great deal of difference in the welfare of the chickens, and the extra labour involved will thus be amply compensated.

Do Not Remove Chickens Too Soon.

A mistake which is often made by inexperienced poultry farmers is to move the chickens from the brooders earlier than they should owing to the warmer weather conditions, and, even if this does not cause any mortality, the chickens do not develop as well as if they were kept in the brooders for the usual period of six weeks.

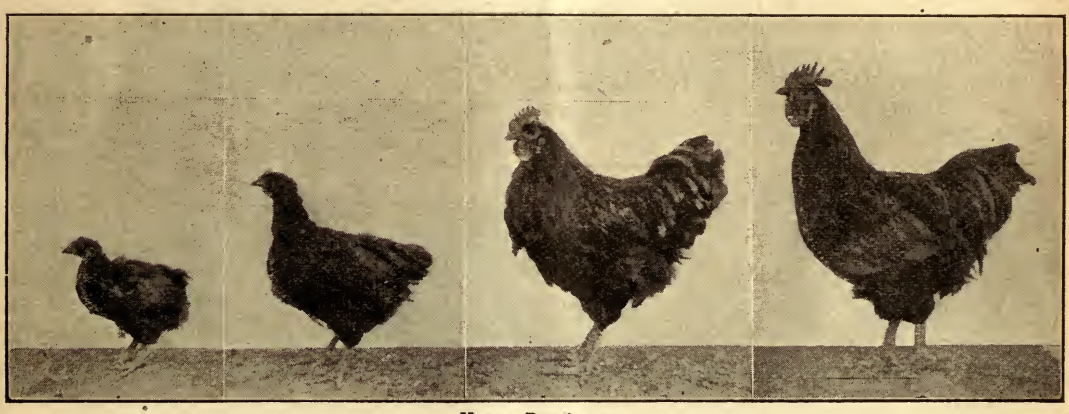
It has to be realised that cold changes are likely to occur at any time during this month and next, and if the chickens are taken away from the warmth of the brooders too early and not kept warm by other means they will pack together. As evidence of this, it is often observed that numbers of chickens are almost devoid of feathers, which is a sure sign that sweating has occurred, and such chickens will never develop as they should.

The Table Poultry Market.

IN view of the more extensive adoption of chick sexing this season, it appears likely that the table poultry market will be somewhat improved for good quality birds. During this month and next there is always a strong demand for grillers, and good birds command satisfactory prices. There are, however, always large numbers of chickens sent in between the poussin and griller stage which tend to spoil the market for better-good condition, as it appears certain that enormous numbers of the later-hatched cockerels will be destroyed this season.

A Brighter Outlook.

There are indications that the market for table poultry will be more attractive during the next year or so, and it should therefore pay poultry farmers to give more attention to the rearing of cockerels under



Heavy Breeds.

Poussin. Griller. Small Roaster. Prime Roaster.



Light Breeds.

Poussin. Griller. Small Roaster. Prime Roaster.

class birds, and consequently poultry farmers would be well advised, where accommodation is available, to hold on to the early cockerels until they weigh about 3 lb.

Those who have the facilities for holding some of the mid-season cockerels for the Christmas market should find a profitable outlet, provided the birds are marketed in better conditions than in the past. It should be understood that on farms where cockerels are not reared to a suitable marketable age, or where pullets only are raised, part of the cost of replacement of hens has to be deducted from the proceeds from eggs, whereas if the cockerels were made to show a profit this would reduce the cost of raising

pullets; thus where no revenue is obtained from cockerels the cost of production is increased.

It is, of course, understood that on many farms facilities are not available for the satisfactory rearing of cockerels for market, and in such cases it is not advisable to attempt to cater for the table poultry market. Nevertheless, this does not alter the fact that the cost of rearing the pullets, less what is obtained for cockerels or hens marketed, must be a charge against the income from egg production.

The Trend Towards Intensivism.

DESPITE advice to the contrary and the warnings of experienced writers overseas, there is an increasing number of poultry farmers adopting intensive methods both as regards rearing chickens and housing laying stock.

Long Shed Housing System Unsatisfactory.

A system of housing layers which is being widely adopted during recent years, but which is not conducive to the health of the birds, is the "long shed" principle with narrow runs in front. In some cases the runs are of considerable length, but it will be noticed that the birds congregate for the greater part of the time immediately in front of the houses, where, in a very short time, the ground becomes contaminated and eventually "fowl sick." This is accentuated where the houses are not provided with ample scratching litter and where the birds are not kept confined during wet weather.



A Double Semi-intensive House.

In proportion to the adoption of such unnatural methods, there appears to be an increase in the incidence of disease outbreaks among adult stock and ailments among the chickens. The recent outbreaks of respiratory diseases should be a warning to poultry farmers, particularly those who are working under intensive methods, and it would require little imagination to visualise what would occur on farms where there is an intensive concentration of birds if contagious disease broke out among them. One of the best safeguards against disease is to provide for adequate runs, both for young and adult stock, and, as far as the young stock are concerned, to make provision for the spelling of the ground over which they are run for several months each year.

It should be realised that the ground under such conditions becomes impregnated with bacteria, which are inimical to the health of the stock, and also becomes

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depleted of all mineral elements, and nothing that can be supplied artificially appears to overcome this difficulty satisfactorily. The main objective in building the "long shed" type of house is, of course, to save labour, but if the saving of labour is carried to such an extent that the health of the birds is affected, the ultimate result will be greater expense to the farmer, together with low returns.

Big Flocks May Mean Low Returns.

The argument may be used that on account of the lower returns from poultry farming during the past few years it is necessary to increase the number of laying stock, and while this may be true up to a point the question which should be carefully considered is whether in many cases increased numbers have resulted in a greater nett return. This, of course, can only be ascertained by working out the average production and taking into account the labour costs. It is certain that in many instances an attempt is being made to rear more stock than can be properly managed, and in such cases no benefit is being derived from the increased numbers.

The greater the expansion of the industry the more necessary it becomes for each individual farmer to give his birds the best possible conditions, otherwise we shall soon be faced with the position that has arisen in other countries, where poultry farming has been developed more on mechanical lines and where mortality has reached alarming proportions and the average returns are considerably below what might reasonably be expected.

REMINDERS FOR SEPTEMBER.

With the approach of warmer weather red mites are likely to become troublesome, and cause a fall in production if not kept in check. Where there is only a light infestation of the perches, painting with creosote or gas residual oil will usually be effective; but where the mites have spread to the walls, spraying with kerosene emulsion is the most satisfactory method of eradication.

Now that the season of peak production is at hand, special attention should be paid to the grit supply. The birds require a greater supply of shell-forming material when they are laying heavily, and any shortage of grit will soon cause a fall in production. Care should also be taken to see that the grit is of good quality, and neither too large nor too fine.

Fowl tick is likely to cause trouble in country districts any time from now onwards. In cases where birds are affected with diarrhoea the presence of tick might be suspected. A leaflet giving information on the control of this parasite is available from the Department.

Guano is a Fertiliser, but Gypsum is not.

IN a summary of the new Fertiliser Act, which appeared in our last issue, it was stated that guano was not a fertiliser within the meaning of the Act. That is wrong, as guano *is* a fertiliser. In error the word "guano" was substituted for "gypsum," the latter, of course, not being a fertiliser and the new Act prohibits its sale as such.

Omphalitis or Inflammation of the Navel of Chickens.

T. G. HUNGERFORD, B.V.Sc., H.D.A.,
Veterinary Officer.

This disease of chickens is typically a disease due to dirty incubators, especially the "hatcher," *i.e.,* the incubator in which hatching of the eggs takes place. However as it is due to an infection, it may sometimes occur in the cleanest and best managed hatcheries, causing considerable loss. It is very seldom noted in hen-hatched chickens.

No one particular germ is responsible for all cases, and on culturing from the inflamed area around the navel and yolk sac quite a variety of organisms may be recovered. Coliform types of germs are the most common, while *Clostridium sporogenes* and *Clostridium tertius* have been recovered as the cause in some cases.

It must be noted that quite a large proportion of chickens, perhaps 2 or 3 per cent., have a scab of coagulated blood and serous material over the navel. This cannot be considered abnormal in itself, but usually indicates that the navel is incompletely closed. This incomplete closure of the navel allows germs to enter the yolk sac, where they rapidly multiply, producing pus, toxins and gaseous material, according to their type. This in turn results in a characteristic train of symptoms.

Symptoms.

Symptoms may show up at the time of or very soon after hatching. The chicken is dull and lethargic and may stand alone, chirping uneasily. A scab of varying type and size is usually seen over the navel, which is incompletely closed. The tissues around this scab are reddened, or in later stages may be discoloured, the discolouration varying in hue according to the progress of the disease. This area is often very swollen and puffed up with gaseous material. At other times the tissues may be soft and watery, this being due to liquefaction



Omphalitis, showing a Scab over the Navel, and Surrounding Inflammation.

This and the two other illustrations are of chickens from a farm where an outbreak resulted in the loss of 10 per cent. of the chicks in the first three days.

necrosis produced by the bacteria causing the condition. The symptoms vary greatly, depending mainly on the different types of causal bacteria. A foul smell of putrefaction is a very common feature.

Deaths usually occur within a few hours of the chicken first showing symptoms.

Post-mortem Appearance.

On opening the chicken, the yolk sac is seen to be abnormal. Usually it is enlarged in size and the yolk contained is abnormal in consistency, sometimes being consolidated into cheesy masses, at other times being liquefied and containing gas bubbles. The wall of the yolk sac is inflamed.

The changes seen in other parts of the body vary enormously, depending upon the type of infection. Sometimes the whole chicken at the time of death is "soggy" and

falls to pieces with very little traction, all the tissues having undergone liquefaction necrosis. The liver is usually paler than normal, but may be congested, showing dilated blood vessels. It is at times easy to confuse the disease with Pullorum Disease (Bacillary White Diarrhoea).



A Chicken Showing Scabbed and Inflamed Navel.

Differential Diagnosis.

The disease may be distinguished from bacillary white diarrhoea, coccidiosis, and salt poisoning by the following features:—

Pullorum Disease. — The characteristic "cedar" colour of the liver in the case of pullorum disease, and the pale greyish-green coloured abscesses in the lung and liver are absent in omphalitis.

Deaths from pullorum disease start about the second day, typically increase in number up to the tenth or twelfth day, and do not stop until about the twentieth day. In omphalitis the deaths mainly occur in the first four days, and very few after the eighth day.

Coccidiosis only occurs in chicks over two weeks of age. The intestinal symptoms and blood in the droppings, characteristic of coccidiosis, are not seen in omphalitis.

Salt Poisoning.—Excess fluid in the tissues is often noted in this, but the characteristic lesions of the navel are absent.

When any doubt exists, the farmer should consult a veterinarian. If in doubt he may take dying chicks, or chicks just dead, to a bacteriological laboratory which deals with such matters, in order that the causal germ may be ascertained.

Although this disease seldom causes such a heavy mortality as does pullorum disease, losses may at times be serious.



Purulent Omphalitis.
The abdominal wall has become involved, infection having spread from the navel.

Prevention by Good Hygiene.

Prevention of omphalitis is to be directed along the lines of good hygiene. Incubators should be scrubbed out with disinfectant

between hatches, and during each hatch two fumigations should be given. A pamphlet on fumigation of incubators is obtainable free from the Department.

It is to be noted that after "sexing" a chicken with omphalitis, it will often show symptoms of distress—gasping and perhaps be unable to stand. In some cases the abdominal wall may rupture during the sexing operation. It is thought that in these cases there is an increased abdominal pressure, and when the person sexing squeezes the abdomen it embarrasses the heart and lung action, producing temporary breathlessness, or even asphyxia.

Providing the person "sexing" is reasonably dexterous and careful in handling the chickens, those that show symptoms of distress as a result of the operation should be looked upon as probable cases of omphalitis.

Treatment of omphalitis will meet with varying success, depending upon the type of germ responsible. Iodine in collodion is satisfactory in some cases; however, in an outbreak of this disease a qualified veterinarian should be called in to make a correct diagnosis.

In most cases it is preferable to kill the affected chicks and burn them promptly. All places where they have been should be disinfected, incubators fumigated, and egg shells from the incubator burned.

Beekeeping Hints (*continued from page* 529).

as Dr. Phillips, of the United States, describes it, "a guest insect." It is about $\frac{1}{16}$th inch long (about the size of the head of a pin), reddish-brown in colour, with body well covered with hairs, and it has a flattened head. Each leg is equipped with a set of about thirty teeth-like claws, enabling a good grip on the hairs of the bee. The name *Coeca* would indicate that the insect is blind, but it has two small eyes with which to see its way about.

M. Perez, a French scientist who observed infested bees, reported "when the Braula wishes to feed it goes to the bee's mouth, where the motions of its feet, armed with bent claws, produce a tickling sensation, perhaps disagreeable to its host, but at least provoking some movement of the buccal organs, which slightly open and release a small drop of honey, which the louse at once licks up."

In Department Circular 324, U.S. Department of Agriculture, by Dr. Phillips, dealing with the development of *Braula coeca,* the following appears:—"The female deposits her eggs on the brood combs in the hive, and they hatch out into typical muscia larvae which make their way into cells containing young bee larvae. The larvae feed on food supplied to the brood by nurse bees, and beyond robbing the bee larvae of a little of their food do no harm. The larvae pupate inside the cells beside the bee pupae; they emerge before the bees do, and make their way at once on to the bodies of their hosts."

It is not often that more than one of these pests is found on a worker, but they have a particular fancy for the queen, and when numerous in the hive cause her a good deal of inconvenience. Where good methods of beekeeping are applied they are not likely to cause much trouble; it is the weak, listless colony, where the hives are not kept clean, that provides the most favourable breeding ground. It has been mentioned as an effective treatment that the infested colony should be opened up in the evening and sprinkled thoroughly with honey water. In cleaning up the dilute honey the bees remove the Braula.

THE prevalence of lice in sheep, particularly in the southern districts, has occasioned much concern, reports the Chief Veterinary Surgeon. It does not appear to be sufficiently recognised that the presence of lice is a definite detriment to the health of the sheep. If infestation is allowed to become serious it leads to broken fleeces and loss of condition and actual loss of wool.

This disease has always been considered of sufficient seriousness as to warrant it being scheduled as one of those diseases which owners are required by law to report to the Inspector of Stock.

THE AGRICULTURAL BUREAU'S PAGE.

Solving State-wide Rural Problems.

Scientist and Practical Farmer Confer at the State Conference.

THE Annual State Conference of the Agricultural Bureau, recently held at Hawkesbury Agricultural College, illustrates in a practical way the general objects of the movement. The ingredients of the conference are some 300 delegates—men and women—from all parts of the State, and representing all of the agricultural industries, the Hawkesbury Agricultural College and its staff, the Agricultural Instructors of the Department of Agriculture, and some fifty lecturers, each an authority on some aspect of rural life—the whole mixed together with a general feeling of good fellowship, a desire to get to know everyone present, and the keen desire for greater knowledge.



The arrival of Sir Alexander and Lady Hore-Ruthven at Hawkesbury College for the State Conference of the Agricultural Bureau.

In the group may be seen (second from left) Mr. W. W. Watson (General President) and Mrs. Watson, Mr. E. A. Southee (College Principal), Mr. C. C. Crane (Bureau Organiser), His Excellency the Governor, Hon. Hugh Main, M.L.A. (Minister for Agriculture), Hon. Lady Hore-Ruthven.

Hawkesbury College—the Ideal Location.

The number of delegates is strictly limited by the accommodation available, *e.g.*, approximately 100 would-be delegates could not be accepted this year. Notwithstanding this restriction, however, no other place in the State could so amply "fill the bill" as the venue for this congress. The traditions of the College, the lessons it presents at every turn, and the fact that all the delegates dine in the one hall and sleep under the same roof, are important factors in the usefulness of the conference.

How the Days are Spent.

As a general sample of the time-table, consider that of the first day. Delegates arrive at the College shortly after 11 a.m., the roll having been called in the train between Sydney and Richmond. Delegates on arrival are shown to their rooms, supplied with conference programmes, and are ready for the midday meal at 12 noon. At 1 p.m. general sessions commence and carry

on till 6 p.m. At 6.40 p.m. the evening sessions commence and carry on till 10.30 p.m. Then, after an hour or so in the "tuck" shop and common room—drinking coffee, telling yarns, singing songs, etc.—delegates are ready for the sleep—which they do not always get.

On the succeeding days of the conference the afternoon and evening sessions are run on the same time-table. As to the morning sessions, the dressing bell rings at 7 a.m., breakfast is at 7.30 a.m., sessions begin at 8.30, and carry on till 12. For the morning sessions, however, the delegates divide themselves into the following groups:—Women's sessions; sheep and wheat sessions; dairy sessions; fruit and vegetable sessions—so that from 8.30 a.m. to 12 each day of the conference four separate conferences are being held concurrently.

In general, the morning sessions deal with technical matters of sectional interest, the afternoon sessions deal with technical matters of general interest and with economics, and the evening sessions deal with matters which might be described as educational entertainments. The conference finishes with a dance, at which a number of visitors are also present, including some sixty or seventy girl friends of those connected with the movement.

Science and Practice in Co-operation.

Details of the actual programme are recorded in the current issue of the *Agricultural Bureau Record,* but it is of interest here to mention that the three great bodies devoted to the solution of agricultural problems in this State are the Department of Agriculture, the Sydney University, and the Council for Scientific and Industrial Research, and that several officers of the Department of Agriculture, one officer of the University, and two officers of the Council for Scientific and Industrial Research contributed to the programme.

It is important that, if these research and educational institutions are to do their best work, their general aims and work must be understood and appreciated by the farmers, and when these officers come before the farmers and discuss with them in every-day language problems that touch the farmers closely, the farmers realise, as they would not otherwise realise, that there is nothing to fear but very much to gain by the application of more and still more science to the primary production industries. And they appreciate, too, that these highly scientific people can meet them as man to man, appreciating the practical aspect and looking for practical suggestions. The result is that there is a good deal of satisfaction that so much help is available, that that help is freely given, and that science and practice go hand in hand, co-operating, advising, conferring on every point. A new interest is acquired by the scientific and by the practical man, each feeling that the gap between theory and practice is being very definitely bridged.

The Agricultural Bureau is organised to provide practical co-operation between the Department of Agriculture and the farmers in any locality. The Department of Agriculture can give sound, practical advice on all matters connected with primary production.

Women in rural districts are also welcomed as members, and their needs are catered for.

Have you a branch in your locality? Full information as to the formation and working of a branch is available on application to the Under Secretary, Department of Agriculture, Box 36A, G.P.O., Sydney.

BUREAU conferences are held annually in each of ten districts throughout the State, and at these functions hundreds of farmers get together to discuss their problems and to give others the benefit of their experience, for "Tell What You Know" is a Bureau slogan.

During this month and next district conferences will be held at Appin (September 27, 28), Tullibigeal (October 2, 3), and Junee (October 16, 17), and anyone interested in the improvement of rural conditions is invited to attend and take part in the proceedings.

Tubercle-free Herds.

THE following herds have been declared free of tuberculosis in accordance with the requirements of the scheme of certifying herds tubercle-free, and, unless otherwise declared, this certification remains in force until the date shown in respect of each herd :—

Owner and Address.	Number tested.	Expiry Date.
		1935.
H. E. A. & V. White, " Belltrees," Scone ...	67	2 Sept.
W. Newcomb, " Minnamurra," Inverell ...	85	6 "
E. P. Perry, Nundorah, Parkville (Guernseys)	25	13 "
J. Lowrey, Gum Flat Road, Inverell ...	68	15 "
Wm. Thwaites, " Lansdowne," Inverell ...	51	16 "
Dr. H. V. Hordern, Park Lands, Berry (Jerseys)	39	16 "
F. L. McGufficke, Eastbourne, Inverell ...	95	18 "
Australian Missionary College, Cooranbong...	62	19 "
Berry Training Farm, Berry	170	20 "
W. S. Turnbull, Flanders Avenue, Muswellbrook	37	27 "
James McCormack, Tumut	81	28 "
Forster & Sons, Abington, Armidale ...	247	31 "
Liverpool State Hospital and Home... ...	104	11 Oct.
H. H. Hinton, Holbrook	15	16 "
Limond Bros. Morisset	43	17 "
E. E. McMullen, Springnook, Holbrook ...	37	9 Nov.
C. Maynard, Holbrook	12	9 "
E. S. Cameron, Big Plain, Narrandera ...	39	21 "
C. Wilton, Muswellbrook	107	28 "
Lunacy Department, Callan Park Mental Hospital	30	30 "
A. Shaw, " Ardshiel," Craven Creek, Barrington (Milking Shorthorns)	141	6 Dec.
Department of Education, Gosford Farm Homes	31	13 "
Riverstone Meat Co., Riverstone Meat Works, Riverstone...	97	13 "
St. Patrick's Orphanage, Armidale	16	13 "
Newington State Hospital and Home ...	100	19 "
Department of Education, Brush Farm, Eastwood	11	20 "
		1936.
E. L. Killen, Pine Park, Mumbil	41	9 Jan.
G. V. Ralston, " Porphyry " Seaham ...	126	10 "
Lunacy Department, Morisset Mental Hospital	43	18 "
New England Experiment Farm, Glen Innes (Jerseys)	29	24 "
C. J. Parbery, Allawah, Bega	105	31 "
J. F. Chaffey, Glen Innes (Ayrshires) ...	69	31 "
A. A. Campbell, Breadalbane, Mullumbimby (Guernseys)	55	27 Feb.
A. B. Finney, Fox Ground, Gerringong ...	35	8 Mar.
Department of Education, Yanco Agricultural High School	54	8 "
Riverina Welfare Farm, Yanco	108	1936. 8 Mar.
Bathurst Experiment Farm (Ayrshires) ...	13	15 April.
New England Girls' Grammar School, Armidale	32	18 "
Cowra Experiment Farm	34	25 "
G. Goodchild, " Calala," Tamworth	66	15 May.
Lidcombe State Hospital and Home ...	170	22 "
Lunacy Department, Gladesville Mental Hospital	21	22 "
The William Thompson Masonic School, Baulkham Hills	47	23 "
A. L. Logue, " Thornbro," Muswellbrook ...	36	30 "
W. E. J. Goodwin, Wybong Road, Muswellbrook	27	30 "
K. W. D. Humphries, " Karoola," Muswellbrook	249	30 "
H. R. Provins, " Happy Valley," Inverell ...	21	31 "
H. F. White, Bald Blair, Guyra (Aberdeen Angus)	352	7 June.
G. L. Genge, " Easton," Armidale	42	13 "
Hawkesbury Agricultural College, Richmond (Jerseys)	121	14 "
Miss N. C. Brennan, Arrankamp, Bowral ...	18	3 July.
Koyong School, Moss Vale	2	4 "
Tudor House School, Moss Vale	21	4 "
Hurlstone Agricultural High School, Glenfield	54	19 "
Navua Ltd., Grose Wold, via Richmond (Jerseys)	58	16 Aug.
W. W. Martin, " Narooma," Urana Road, Wagga	139	26 Sept.
Wolaroi College, Orange	20	12 Nov.
Lunacy Department, Parramatta Mental Hospital	17	28 "
Stace Bros., Taylor Street, Armidale ...	20	13 Dec.
Wagga Experiment Farm (Jerseys)	62	13 "
St. Patrick's College, Goulburn	9	18 "
George Rose, Aylmerton	4	19 "
		1937.
Wollongbar Experiment Farm, Lismore (Guernseys)	112	14 Jan.
R. C. Dixson, Elwatan, Castle Hill (Jerseys)	23	12 Feb.
Lunacy Department, Rydalmere Mental Hospital	60	22 May.
Lunacy Department, Kenmore Mental Hospital	95	30 "
Puen Buen Ltd., Scone (Jerseys)	219	25 July

Tubercle-free Areas.

The following Areas have been declared tubercle-free and no cattle are allowed to be kept therein unless subjected to the tuberculin test and found free from tuberculosis :—

Bombala Area.
Inverell Area.
Municipality of Muswellbrook.
Municipality of Queanbeyan.

—MAX HENRY, Chief Veterinary Surgeon.

Abortion-free Herds.

THE following herds have been declared free of contagious abortion (Bang's disease) in accordance with the requirements of the scheme of certifying herds abortion free :—

Owner and Address.	Number in herd.	Owner and Address.	Number in herd.
Bawtree, B. F. W., Ben Lomond	22	McSweeney, W. J., "The Rivers," Canowindra (Shorthorns)	45
Bush, W., Ben Lomond	32	Martin Bros., "Narooma," Urana-road, Wagga Wagga	146
Caldclough, A. E., "Dunelm," Ben Lomond ...	32	Murray, A. W., Oakwood, via Inverell	26
Cann, H. J., The Gap, Alstonville	...	Navua Ltd., Grose Wold, via Richmond (Jerseys) ...	57
Dixson, R. C. "Elwatan," Castle Hill	20	Rydalmere Mental Hospital, Rydalmere	63
Douglas, L. M., Ben Lomond	19	Sams, C. R., Wilson's Creek, Mullumbimby	32
East, N. A. L., East Valley, Gum Flat, via inverell...	51	Sigley, A., Wilson's Creek	35
Forster, N. L., Abington, Armidale (Aberdeen-Angus)	170	Smith, Jas. C., Ben Lomond	43
Forster and Sons, Abington, Armidale (Jerseys) ...	62	Walker, Jas. R., "Strathdoon," Wolseley Park ...	33
Hawk, J. T., Ben Lomond	11	White, F. J. and Sons, Bald Blair, Guyra	238
Henderson, C. Beaufort, Glen Innes	17	Williams, Chas., Ben Lomond	41
Henderson and Son, Upper Wantagong, Holbrook ...	111	Wilson, R. A., Meryla, Culcairn	43
King, H. S., Glenroy, Llangothlin	43		
McSweeney, W. J., "The Rivers," Canowindra (Jerseys)	95		

—MAX HENRY, Chief Veterinary Surgeon.

Infectious Diseases Reported in July.

The following outbreaks of the more important infectious diseases were reported during the month of July, 1935 :—

Anthrax	Nil
Blackleg	9
Piroplasmosis (tick fever)	Nil
Pleuro-pneumonia contagiosa	Nil
Swine fever	Nil
Contagious pneumonia	Nil
Necrotic enteritis	2

—MAX HENRY, Chief Veterinary Surgeon.

Agricultural Societies' Shows.

SECRETARIES are invited to forward for insertion in this list dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Box 36A, G.P.O., Sydney, not later than the 15th of the month previous to issue. Alterations of dates should be notified at once.

1935.

Peak Hill (W. R. L. Crush)	...Sept. 3, 4	Quandialla	... Sept. 25
Young	... „ 3, 4, 5	Hillston	... „ 25, 26
Ungarie	... „ 4	Gosford (J. C. Brandis)	... „ 27, 28
Galston (J. S. Gibbs)	... „ 6, 7	Narrandera (J. D. Newth)	... Oct. 1, 2
Parkes (L. S. Seaborn)	... „ 10, 11	Ardlethan (E. C. Knight)	... „ 2
Cowra	... „ 10, 11	Bribbaree	... „ 2
West Wyalong	... „ 10, 11	Deniliquin (P. Fagan)	... „ 2
Murrumburrah	... „ 12, 13	Walbundrie (H. G. Collins)	... „ 2
Barmedman	... „ 14	Leeton (E. C. Tweedie)	... „ 8, 9
Canowindra	... „ 17, 18	Corowa (H. G. Norton)	... „ 8, 9
Forbes (F. N. Sykes)	... „ 17, 18	Ariah Park	... „ 9
Narromine (F. S. Stening)	... „ 17, 18	Griffith	... „ 15, 16
Temora	... „ 17 to 19	Illabo	... „ 16
Boorowa	... „ 19, 20	Cootamundra	... „ 22, 23
Hay (Geo. C. McCracken)	... „ 24, 25	Lismore (H. Pritchard)	... Nov. 19 to 21
Barellan	... „ 25		

1936.

Yass (S. C. Sleeman)	... Feb. 25, 26	Maitland (Montie Brown)	... Mar. 4 to 7
Moss Vale (H. Richardson)	... Mar. 5, 6, 7		



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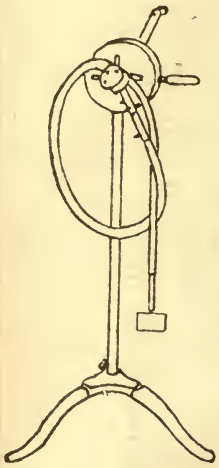
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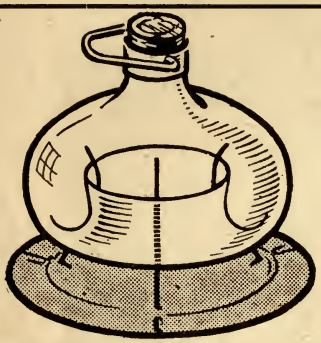
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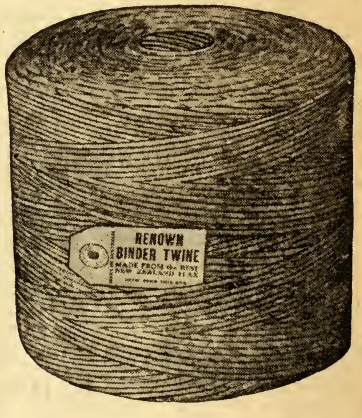
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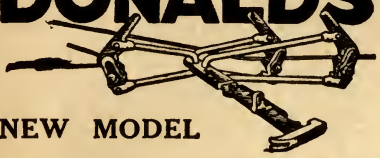


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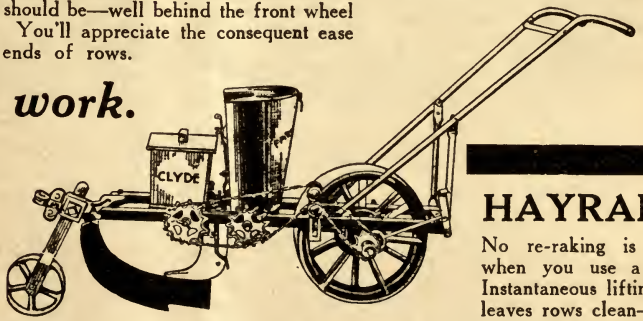
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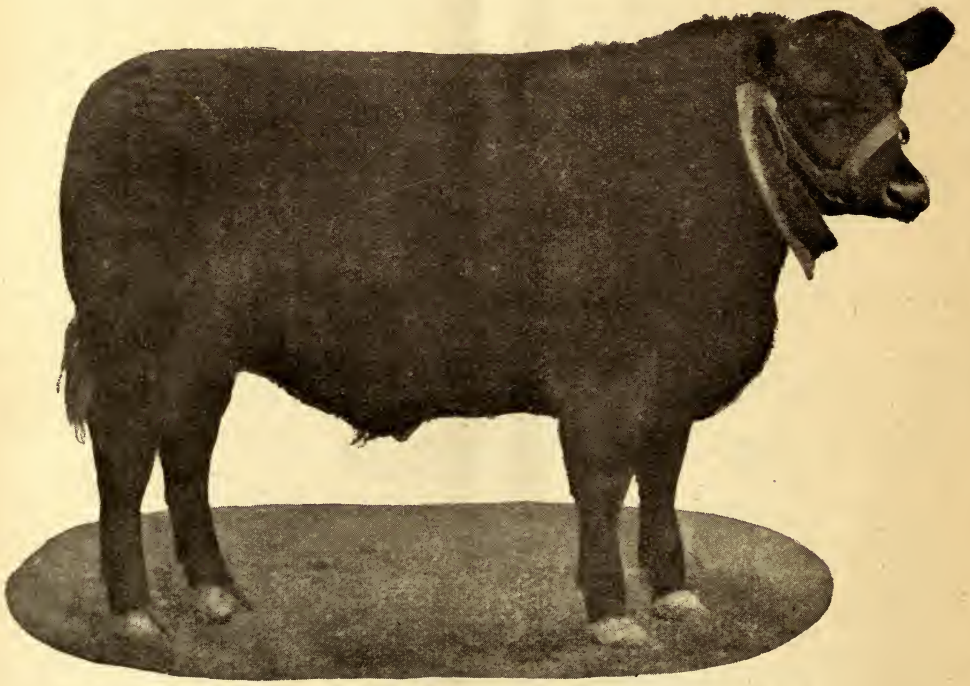
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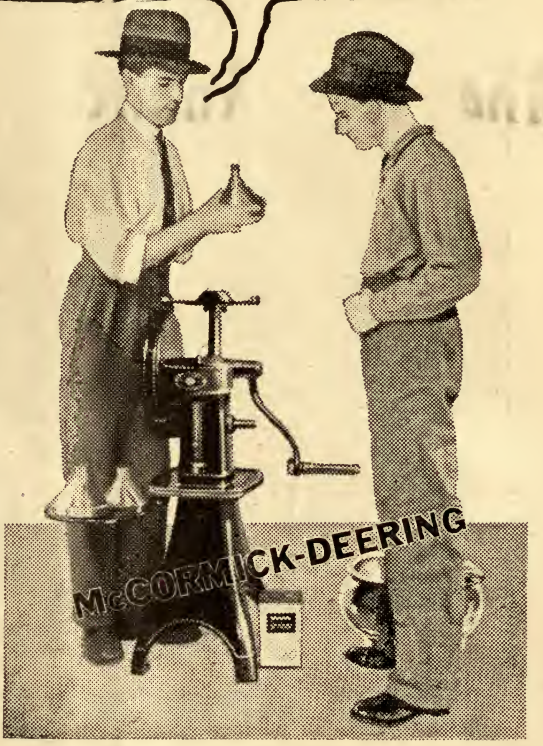
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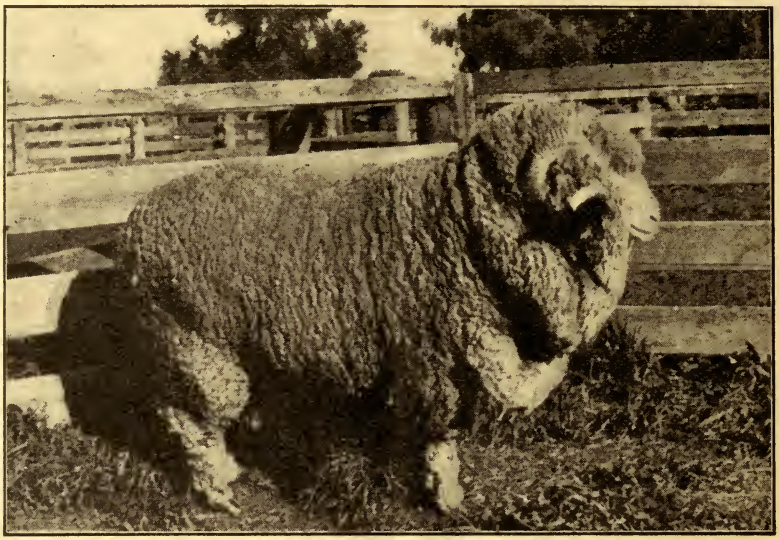
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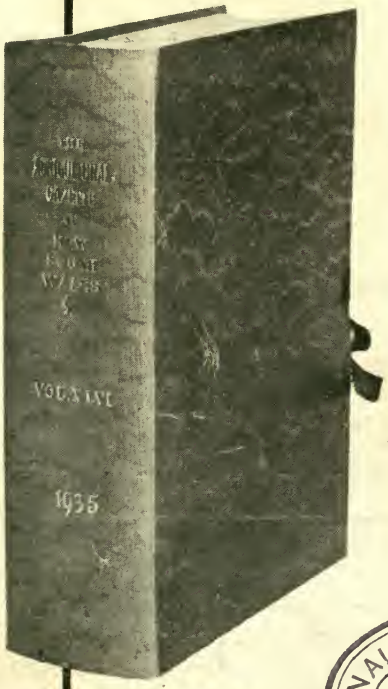
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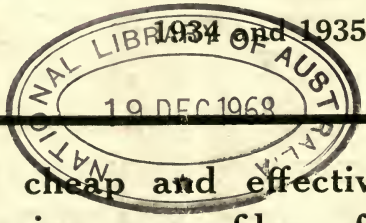
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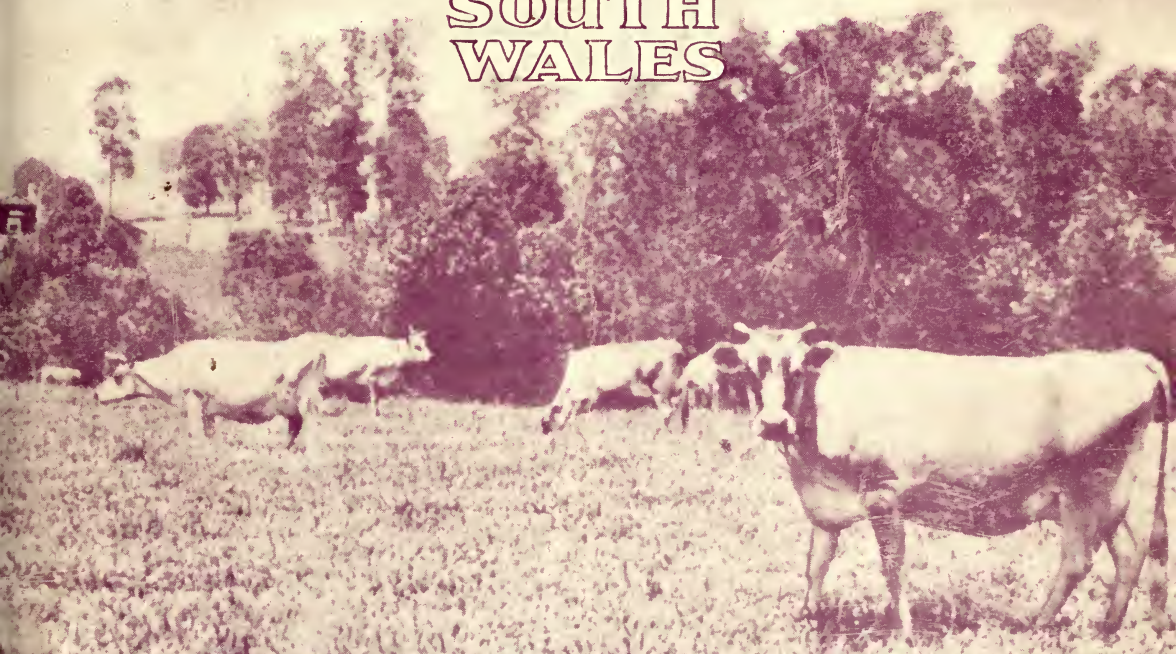


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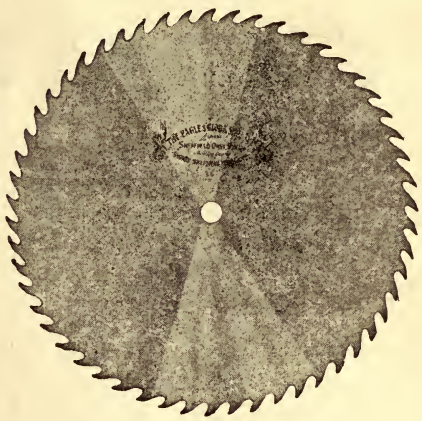
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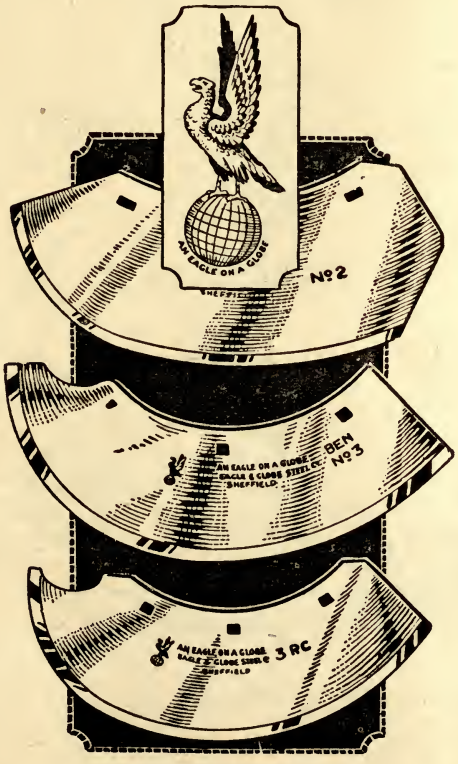
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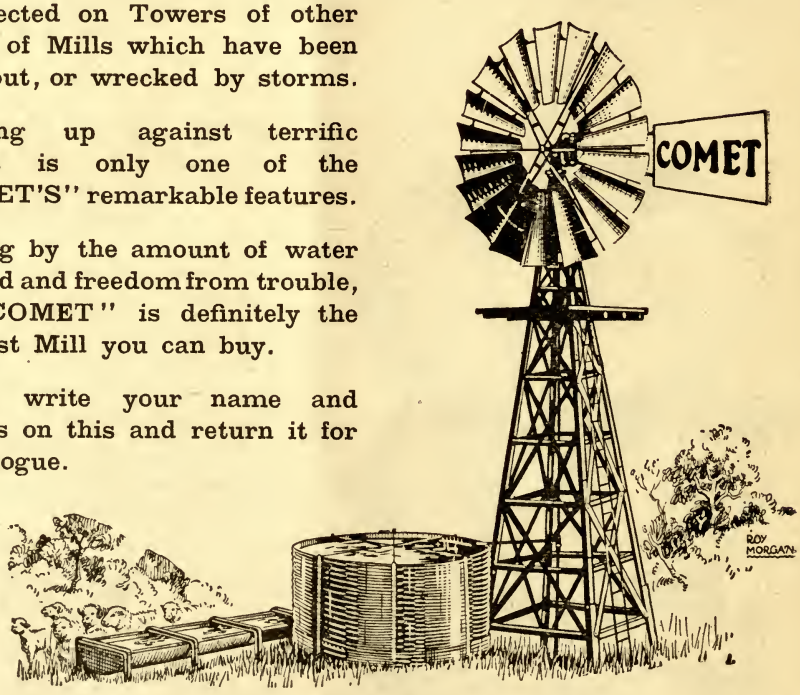
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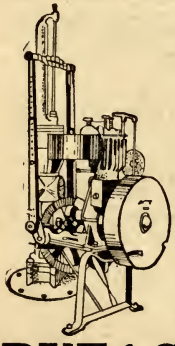
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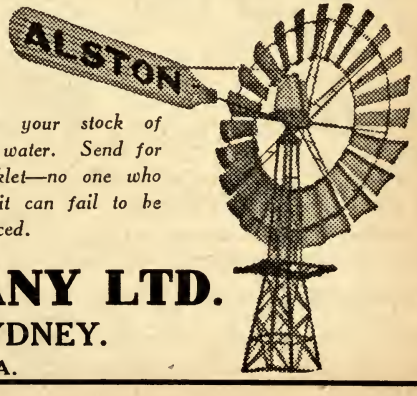


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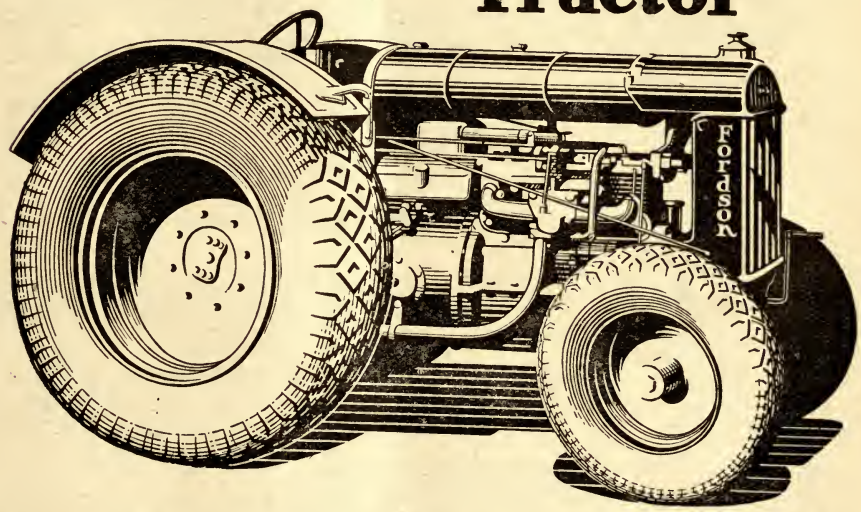
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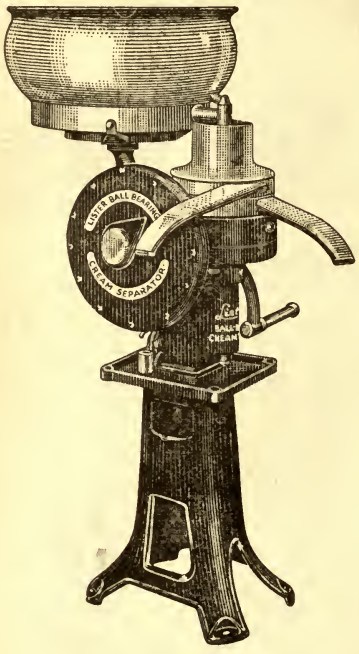
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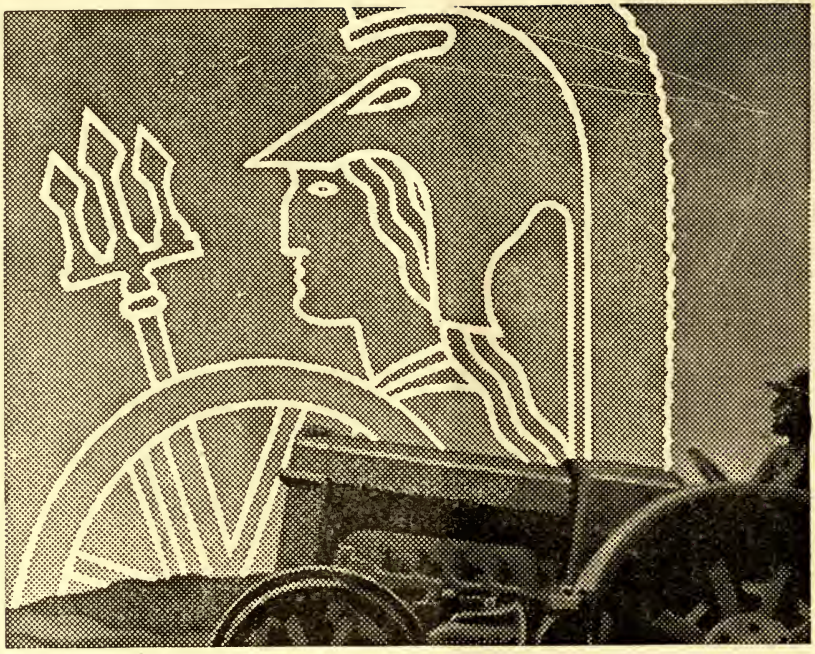
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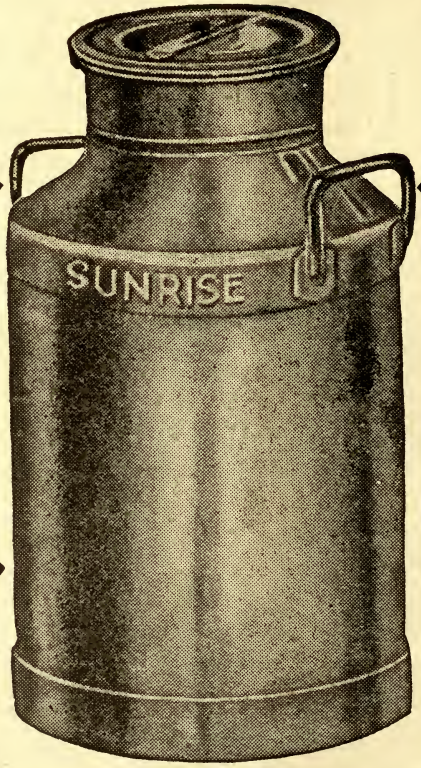
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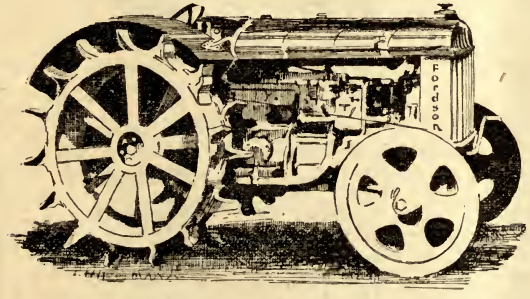
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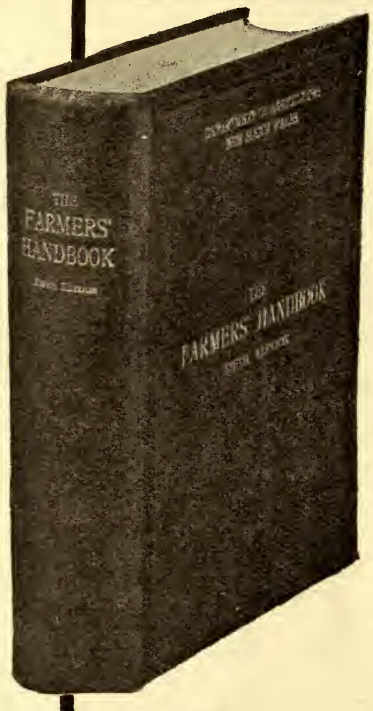
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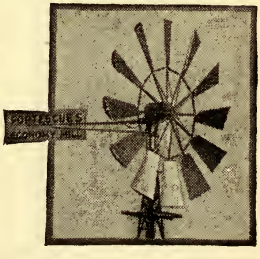
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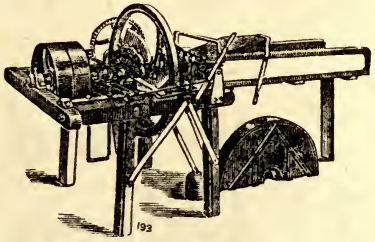
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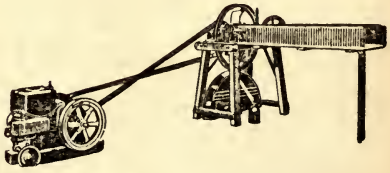
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(Signed) M. SUTTON.

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Via Toowoomba, Q.,
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(Signed) E. H. IRVINE.

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(Signed) J. E. CLAYTON.

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Vol. XLVI. Part 10. *OCTOBER* 1, 1935.

. . THE . .

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. . OF . .

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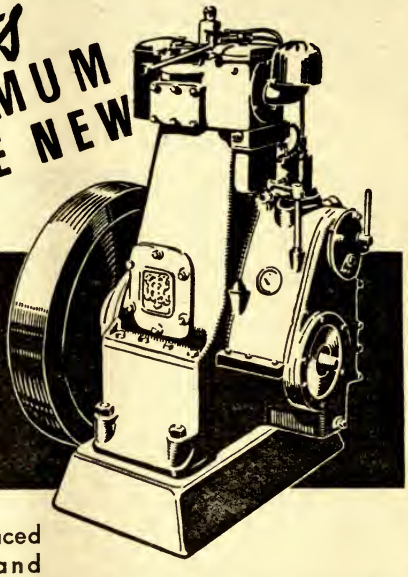
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THE AGRICULTURAL GAZETTE OF NEW SOUTH WALES

Vol. XLVI. Part 10. October 1, 1935.

The Weak Link In the Dairying Industry.

Insufficient Fodder Conservation.

H. C. STENING, H.D.A., Chief Instructor of Agriculture.*

IT is most regrettable that it should require adverse conditions, such as have been experienced this season in many coastal districts, to convince dairy-farmers of the necessity to conserve fodder. Unfortunately, the protracted dry spell has been responsible for a serious decline in dairy production, for the falling away in the condition of stock, and probably if it continues will result in serious losses of stock, which all serves to indicate how very inadequate is the provision that is generally made by dairy-farmers to tide over lean periods.

It is true that there has been a progressive increase in the total quantity of fodder conserved each year in coastal areas, no doubt as the result of the publicity which is given to the subject by medium of fodder conservation competitions, but the rate of increase is far too slow. The total fodder conserved each year would not provide a maintenance ration for all the cattle carried on registered dairies on the coast for more than a week, much less provide for even a short dry spell, and it is of the utmost importance that this weak link in the dairy-farmer's husbandry should rapidly be strengthened.

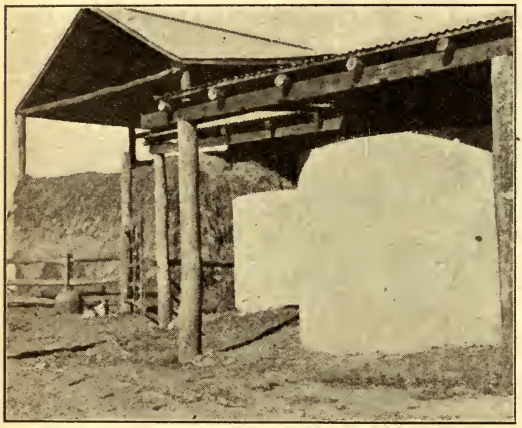
THE fodder conservation competitions carried out this year in coastal districts were the most successful to date, both as regards the number of entries and the high standards set by the competitors. Twenty-six district competitions were organised, in which 169 dairy farmers competed.

Previously the coastal area was divided into four championship zones, but this year the boundaries were altered so as to make only two coastal zones—the north coast and the south coast. These new divisions are clearly shown on the map which appeared in our September issue.

* Mr. Stening judged the championship fodder conservation competitions for the coastal divisions, and it is from his report that this article is compiled.

Competitions Point the Way.

It is the aim of these competitions to encourage dairy farmers in the first place to conserve sufficient fodders of the right type for the feeding of their dairy cattle during the winter months when pastures are generally sparse and lacking in nutriment, and then to provide additional reserves to meet



Lucerne Hay and Pit Silage.
Portion of Mr. Ken Colless' fodder reserves.

any shortage of natural feed or failure of crops that may occur at any other part of the year as the result of drought, flood, etc. For the first time in the history of these competitions all competitors had conserved ample fodder for the feeding of their herds for the five lean months of winter and early spring, and also had additional reserves to meet some of the emergencies mentioned.

Silage Popular.

All competitors except one relied on silage as the basis of their stored fodders, which is ideal for providing the bulk portion of the feeding ration, being succulent and palatable, and, if properly made, there is less loss of nutrients in conserving crops as silage than if they were made into hay. Furthermore, in coastal districts silage making, unlike haymaking, is quite independent of weather conditions.

There has been a substantial increase in the quantity of silage conserved each year in coastal areas. In the year 1933-34 there were 44,433 tons of silage made on 598 farms as compared with 31,996 tons on 475 farms in the preceding year.

It is pleasing to note the increase in the number of dairy farmers who are practising the conservation of fodder as silage, but the number is still only a very small fraction of the total farmers engaged in coastal dairying, and there is a great need for the practice to be adopted more generally.

The Pit Silo is Cheap.

Preference was shown by competitors for green maize for silage making, while a few used sorghum. Both are eminently suited for the purpose when chaffed, and they have the advantage of the production of heavy yields, thus reducing the cost of conservation.

Four different methods were adopted for conserving silage, and this presented an opportunity for making comparisons between the tower silo, pit silo, trench silo, and stack. Ten competitors possessed tower silos constructed chiefly of reinforced concrete; this type of silo is generally favoured on account of its general efficiency, durability and convenience, and the availability of advances on easy terms from unemployment relief funds for the purpose of construction of silos has been a strong factor in inducing farmers to adopt this system.



Security and Convenience.

The pit silo is increasing in popularity, chiefly on account of its lower initial cost, and it was adopted by seven competitors. These pits vary in depth, but generally are 20 to 25 feet deep, and while some have just the earth walls with a concrete collar at the top, others are lined with concrete or brick plastered with cement. The total cost of construction of the latter would not exceed £1 per ton capacity, but in some

cases the work can be done by the farmer himself. These pits are under cover and alongside the feeding stalls, and lifting gear can be devised for hoisting sufficient silage at one operation for the whole herd. There is, therefore, no reason why they should not be just as efficient, durable and convenient as the tower silo, and there are some dairy farmers who claim that a better silage is produced in the pit under the climatic conditions of the north coast.

Of course, there are limitations as to sites where pits may be excavated; for instance, a permanent ground water-table close to the surface, or the danger of seepage, would prove obstacles to the construction of a pit silo, while the costs would be increased in the case of rock formation, which would make sinking very difficult, or if the soil is of a sandy or gravelly nature that will not permit of digging without caving in.

Trench Silo Favoured by Many.

Eleven entrants used the trench method, which continues to increase in popularity chiefly on account of its cheapness, as farmers are able to excavate the trench themselves without any outlay of cash, and then after experiencing the benefits of silage made by this method some farmers are prepared to incur expenditure for the greater convenience of the tower silo. The practice adopted by a few competitors of conserving the silage required for winter feeding in tower silos and that required for drought reserve in trench silos is well worth following.

Only two competitors had silage stacks, and these were supplementary to trench silos, and they are quite convinced that the stack method is much too wasteful.

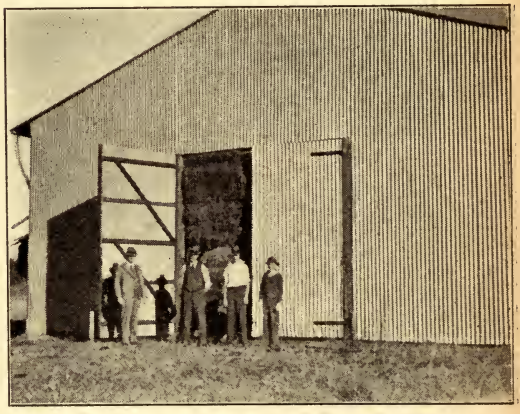
Lucerne to Balance the Ration.

A pleasing feature of this year's competitions was the increased attention that was given to the conservation of lucerne hay for combining with maize silage to improve the feeding ration. All competitors except one had included lucerne hay in their reserves.

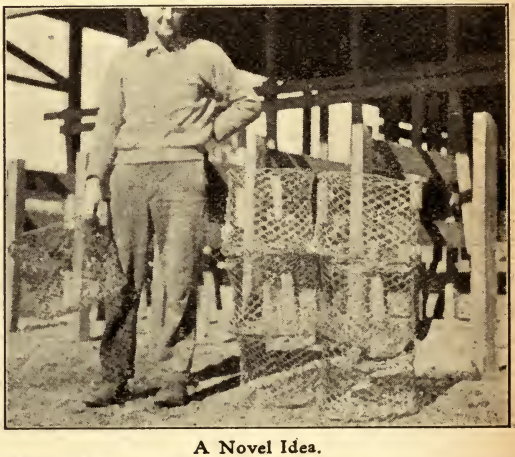
There is room for improvement on some farms in the method of storing cob maize, for unless a suitable corn crib or well ventilated barn is provided, loss frequently occurs as the result of damage by weevil, mould, and rats and mice. For shelled grain



Movable Roof on Haystack.



Good Lucerne Hay is Worth a Good Shed.



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the galvanised iron tank provides the most suitable storage; it should be air-tight so that the grain may be effectively fumigated should weevil make an appearance.

South Coast Champion: Mr. Ken Colless.

For the third year in succession Mr. Ken Colless, of Emu Plains, carried off the championship of the south coast zone. His property of 85 acres is situated on the Nepean River, and the greater portion of it is under fodder crops. Lucerne crops occupy 10 acres, maize is grown on 20 acres for green fodder and silage and on 7 acres for grain, and sorghum on 10 acres.

The bulk of the fodder reserves is 288 tons of good quality silage made from chaffed green maize and sorghum and conserved in five round pits 20 to 25 feet deep, which are lined with bricks plastered with cement, and they all adjoin the large feeding stalls. Lucerne hay to the amount of 20 tons is neatly stacked in a shed adjacent to the feeding stalls and another 36 tons in another shed with 7 tons of oaten hay. Seven tons of maize grain completes the total quantity of fodder conserved, which is sufficient for feeding 167 head of cattle for the stipulated period, or more than four times the requirements. The combination of fodders is satisfactory and the protection and general lay-out for the convenience of feeding leaves little to be desired.

RESULTS of South Coast Championship.

Competitor.	Society.	Suitability.	Quality.	Location.	Protection.	Economy of Production.	Carrying Capacity.	Surplus.	Total.
	Maximum points ...	30	35	20	20	25	60	10	200
Ken Colless, " Inverleigh," Emu Plains	Nepean (Penrith) ...	29	32	18	19	22	60	10	190
J. Masters, " Bundywalla," Berry ...	Berry...	29	33	19	18	23	60	7	189
N. S. Bate, " Old Bodalla," Bodalla ...	Bodalla	28	33	18	19	23	60	7	188
Mrs. M. E. Marion, " Panuara," Tongarra.	Albion Park ...	24	32	18	19	23	60	10	186
F. J. Doust, " Lynn Farm," Camden ...	Camden	26	32	18	18	22	60	10	186
W. A. Green, " Limerick Vale," Towamba.	Eden	28	31	18	18	22	60	9	186
W. J. Irving and Sons, " Erina," Bega...	Bega	28	32	18	18	23	60	5	184
F. J. Johnston, " Mulgrave Place," Pitt Town.	Hawkesbury... ...	27	32	18	19	22	60	6	184
A. Mottram, " Prairie Vale," Numba ...	Shoalhaven (Nowra)	28	32	19	19	23	60	1	182
J. Fleming, " Balfron," Rocky Hall ...	Pambula	27	31	16	17	23	60	5	179
O. Pearson, " Oakleigh," Albion Park ...	Dapto	26	31	17	18	23	60	4	179
E. F. Bartlett, " Shannon View," Moruya.	Moruya	26	32	18	18	23	60	1	178
E. W. Paterson, " Woodstock," Jamberoo.	Kiama	23	32	18	19	23	60	2	177
H. O. Cox, " Melross," Kangaroo Valley	Kangaroo Valley ...	27	30	17	18	22	60	3	177
H. F. Sawtell, " Narira," Cobargo ...	Cobargo	27	30	17	18	22	60	2	176
H. P. Godfrey, " Gunawah," Bemboka	Bemboka	26	30	17	16	22	60	2	173

Mr. S. O. Masters, North Coast Champion.

The three zones into which the coastal area north from Newcastle was previously divided were this year grouped together into one division. Ten societies conducted competitions, the winners of these local competitions contesting the championship, which was won by Mr. S. O. Masters, of Raworth, via Morpeth.

His property of 64 acres has a frontage of 2 miles to the Hunter River, the whole of the land being rich alluvial flats. The cropping includes 20 acres of lucerne, 12 acres of maize for green fodder and silage and 4 acres for grain, 1½ acres of sorghum, 16 acres of potatoes and 5½ acres of sown pastures. The chief improvements since the previous year are twin concrete

tower silos which contained at the time of judging 118 tons of silage of mostly chaffed maize with about 32 tons chaffed sorghum. The silos are located at one end of the feeding stalls. Lucerne hay (106 tons) was stacked mostly in a large shed and the remainder in well-protected stacks. With 4½ tons of maize grain the total quantity of fodder is ample for the feeding of 153 head of cattle over a period of five months, which is three times the estimated carrying capacity of the property under natural pasture. The quality and the combination of the fodders are highly satisfactory.

Below: **The Judge Inspects a Pit Silo at Camden.**





Above: **Maize Storage Tanks on a North Coast Dairy Farm.**

Results of North Coast Championship.

Competitor.	Society.	Suitability.	Quality.	Location.	Protection.	Economy of Production.	Carrying Capacity.	Surplus.	Total.
	Maximum points ...	30	35	20	20	25	60	10	200
S. O. Masters, Raworth, via Morpeth.	Hunter River ...	29	33	18	18	21	60	10	189
W. J. Hammond, "Rosecliff," Bellingen.	Bellinger River ...	28	32	20	19	22	60	6	187
J. W. Gambley, "Maria," Old Bonalbo.	Casino	27	31	19	19	23	60	7	186
E. L. R. Keech, "Dungannon," Wingham.	Upper Manning ...	28	32	18	19	21	60	6	184
W. G. Russell, "Old Farm," Mt. Thorley, via Singleton.	Northern (Singleton)..	28	32	17	18	20	60	8	183
R. G. Watts, "Maroubra," Roxburg, via Muswellbrook.	Upper Hunter ...	27	30	15	17	22	60	10	181
W. R. Winkley, "Glendyn Park," Paddy's Plains, North Dorrigo.	Dorrigo	29	31	18	18	23	60	1	180
A. G. Wessell, "Four Winds," Chatham.	Manning River ...	25	29	19	19	22	60	5	179
J. W. Fischer, "Pickfair," Turner's Flat.	Macleay River ...	27	31	14	19	23	60	4	178
James Fahey, "Parkmoor," Copmanhurst.	Clarence River ...	23	32	16	18	20	60	6	175

Insect Pests of Stored Grain.

Their Prevention and Control on the Farm.

[Concluded from page 502]

T. McCARTHY, Senior Assistant Entomologist.



Left : **Common Grain Weevil** (*Calandra oryzae*)

Below : **Angoumois Grain Moth** (*Sitotroga cerealella.*)



THE increasing tendency to store grain on the farm as a standby for stock in dry times has naturally resulted in considerable inquiry concerning the protection of such grain from insect attack. Numerous species were associated with stored grain in one way and another, observed Mr. McCarthy in the first portion of this article in the September "Gazette," but the four primary pests (those capable of attacking sound grain, and notably the common grain weevil and the grain moth) were the farmer's main problem.

The writer described the habits of the important species and the damage caused by them, and discussed the origin of infestation. It was a surprisingly common fallacy that infestation was the result of spontaneous generation, but insects could only occur as the direct result of egg-laying by the female of the species. In the following pages are detailed the methods of storage best calculated to prevent the access and multiplication of these pests. The fumigation of infested grain is also described.

Grain is stored on the farm or station in a number of ways. The bags may be stacked on a raised platform or on timber dunnage on the ground surface. It may be stored in sheds or barns, or in properly constructed concrete, wooden or (more usually) galvanised iron silos. Of these methods the storage of the grain in silos is by far the most satisfactory and should be adopted wherever circumstances permit.

Storage of Grain in Bags in Stacks.

Where silos are not available or cannot be adopted, storing the grain in bags in stacks or in sheds or barns must be employed, and every care should be taken to see that the work is carried out in such a way as to minimise insect attack and make the treatment of the grain possible if this becomes necessary.

In storing bags in stacks in the open, placing them on a raised platform well off the ground and covered with closely-fitted boards is perhaps the most desirable method, but when a large number of bags has to be stacked the construction of the platform becomes a big undertaking. If the bags are stacked close to the ground they may be placed on timber dunnage such as old railway sleepers or poles, but a platform of concrete or a closely boarded wooden floor is to be preferred.

If the site chosen for the stack has previously been used for the same purpose, it should first be thoroughly cleaned up, as old sites are frequently the primary cause of weevil infestation in the new grain. All waste grain should therefore be destroyed, and the ground ploughed up, especially if

mice and rat holes are noticed. When timber dunnage on which grain has previously been stacked is used, it should be dipped in a trough of boiling water to kill any weevils sheltering in cracks or holes. As an additional precaution where timber dunnage is used for stacking, the ground may be covered with a layer of slaked naphthalene and lime (1 part to 20 parts) two to four inches thick. Precautions should also be taken to prevent rain water from running underneath the stack, as it is essential to keep the ground beneath as dry as possible.

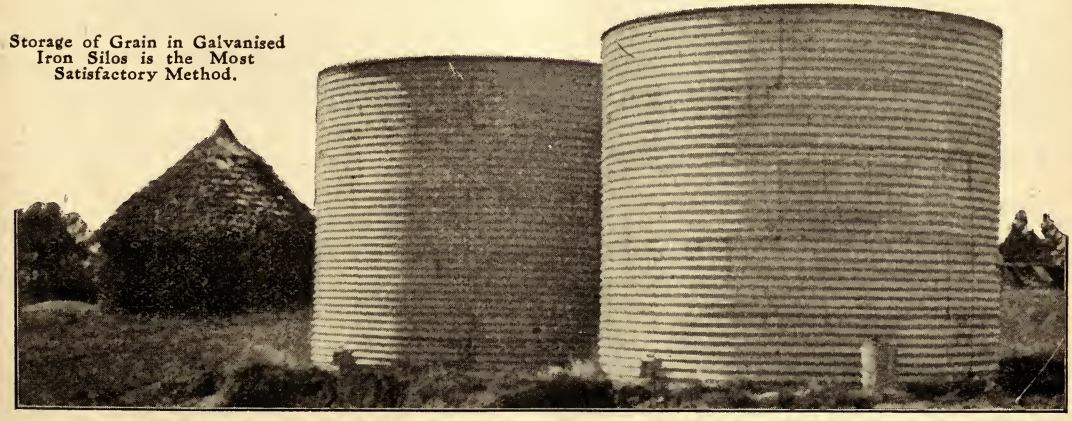
The bags should be stacked as close together as possible so as to reduce the amount of air space in the stack. After the stack is completed it should be securely covered to protect it from the weather. The roof, which is generally of galvanised iron sheeting, should if possible be independent of the bags, as when rested on the latter any shrinkage of the stack permits the water to flow into the stack between the iron sheets. The sides of the stack should also be well protected with closely woven hessian or other material, which should be sufficiently far away from the bags to prevent rain beating through.

Although covering a stack in the above manner will help to prevent it from becoming weevil-infested, it will not obviate the danger, and such a stack may eventually become badly infested. A stack covered in such a way could not, moreover, be effectively fumigated. For this reason encasing the stack entirely with malthoid or other material with the joints sealed up, making it as nearly as possible air-tight, is far more satisfactory. Not only can the stack be then satisfactorily fumigated, but it has been demonstrated that encasing the stack in such a manner is alone sufficient to kill the weevils, owing to the rapid increase in the percentage of carbon dioxide caused by the so-called respiration of the grain and the production of carbon dioxide by the weevils themselves. It is unlikely, therefore, that grain in a stack covered with malthoid or other similar material would be seriously damaged by weevils or other grain insects.

It is always very advisable, and particularly where stacks are placed on timber dunnage, to mouse-proof the stack. Mice not only destroy quantities of the grain, but in addition damage the bags and allow grain to trickle down between the dunnage, where it becomes a breeding ground for grain insects beneath the stack. It is recommended, therefore, that all such stacks should be mouse-proofed by erecting galvanised iron barriers at least twenty-four inches high round the stack. The iron sheets should be inclined slightly outwards and all the joints closely fitted.

Storage in Bags in Sheds or Barns.

A shed or barn for the storage of grain in bags should always be reasonably well constructed. A concrete or closely boarded wooden floor is advisable, otherwise grain that may leak from the bag falls on to the ground and becomes badly infested with weevil which later migrate to the stack and enter the bags. It should be well covered so as to exclude rainwater, and the sides should be well fitted so as to reduce the number of cracks to a minimum, enabling the building to be easily made gas-tight should fumigation become necessary.



Storage of Grain in Galvanised Iron Silos is the Most Satisfactory Method.

Before storing the new season's grain the shed should be thoroughly cleaned up. All waste grain should be swept up and destroyed; the walls should also be swept, and as an additional precaution to kill any weevils still sheltering on the walls the latter might be sprayed with a strong kerosene emulsion containing 3 per cent. of cresylic acid. If the shed contains a quantity of infested grain the whole should be fumigated before introducing any new season's grain.

Storage in Silos.

Storage in silos in bulk is easily the most satisfactory method of storing grain on the farm, and should be adopted wherever practicable. Concrete, wooden or galvanised iron silos may be adopted, but the galvanised iron silo is the most popular among farmers, and has given great satisfaction. Particulars of construction are obtainable on application to the Department. An illustration of such a silo appears on page 547.

Remedial Measures.

The various methods of storing grain just described are recommended as means of reducing the possibility of infestation and loss that invariably occur when grain is haphazardly stored for long periods. Should the grain become infested it is then necessary to fumigate it with some suitable fumigant to check further damage.

Grain stored in silos or well constructed sheds which can be made reasonably gas-tight can be readily fumigated, but, as previously pointed out, bags in stacks are difficult to fumigate unless covered with malthoid or other similar material. Small numbers of bags can, however, be fumigated by enclosing them in heavy tarpaulins which should be carefully tucked in under the bottom bags.

Carbon bisulphide or hydrocyanic acid gas are the fumigants most commonly used, and of these carbon bisulphide is to be preferred, though it has the disadvantage of being highly inflammable, and lights of any kind must be kept away from it during the process. Calcium cyanide dust, blown in occasionally between bags in stacks, will kill numbers of weevils as well as rats and mice, but stacks should be mouse- or rat-proofed as soon as constructed.

When fumigating with carbon bisulphide a silo or shed that has been made reasonably gas-tight, it should be used at the rate of 5 lb. (3 pints) to each 1,000 cubic feet of space contained in the silo or shed when empty. In calculating the cubic contents it is handy to remember that a silo or shed holding 1,000 bushels of grain when full would have a cubic content of approximately 1,300 cubic feet. Under other than reasonably gas-tight conditions, at least four times the above quantity of carbon bisulphide should be used.

The carbon bisulphide should be poured on to some sacks placed on top of the grain and then the door or other opening carefully sealed. Fumigation should be carried out for twenty-four hours or longer, except in the case of grain for seed, which should be treated for the minimum period only.

In lieu of carbon bisulphide, mixtures of ethylene dichloride and carbon tetrachloride (3 parts to 1 part by volume) and non-inflammable mixtures of carbon bisulphide are sometimes used, but their non-inflammability is their only advantage.

Infectious Diseases Reported in August.

The following outbreaks of the more **important** infectious diseases were reported during the month of August, 1935:—

Anthrax	Nil
Blackleg	4
Piroplasmosis (Tick fever)	Nil
Pleuro-pneumonia contagiosa	1
Swine fever...	Nil
Contagious pneumonia	3
Necrotic enteritis	Nil

—MAX HENRY, Chief Veterinary Surgeon.

Gully Erosion.

A Serious Menace to Farming and Grazing Land.

E. S. Clayton, H.D.A., Senior Experimentalist.

THERE are numerous instances of the serious damage caused by gully erosion to farming and grazing lands in Australia.

The first effect of the formation of gullies in cultivated land is the division of the paddocks into small areas which have to be cultivated separately, and then if the erosion is not checked branch gullies are formed, immense quantities of fertile soil are carried away and the land is rendered unsuitable for cultivation, or even for grazing.

Vast areas of arable land have been destroyed in this way, and damage has also been caused by the undermining of farm buildings and even houses; by the cutting across of roads, rendering them dangerous and their maintenance expensive; by the silting up of reservoirs and tanks; and by the deposition of coarse sand washed from the hills on rich alluvial flats, to their great detriment. The life of stock may also be endangered by the animals grazing close to the edge of the undermined gully-banks.

The position is becoming more serious each year. Erosion is progressive, and the longer corrective action is delayed the less effective and the more expensive will it be.



A Gully which is Destroying River-flat Land.
This has been formed within twenty years.

Gullies can be controlled, but it is essential that any method must ensure the healing of the surface, particularly at the heads of gullies and on the banks where the erosion is most active, and then the protecting of it with grass, shrubs, trees and vines, if success is to be achieved. Various means of controlling gullies have been adopted, the most economical for any locality being determined by the local conditions.

Generally it is not possible to fill a gully to its former level, as much soil has been removed and irrevocably lost. It is possible, however, to check the further active erosion of gullies on most properties.

The Work Must be Planned.

Much labour is often misspent in reclaiming gullies because of lack of knowledge. There have been many instances where

land-owners, alarmed at the increasing proportions of a gully, have prevented the entrance of the water and turned it elsewhere—only to find after a few years that they have two large gullies to deal with instead of one. The haphazard throwing into a gully of trees, brush, straw or stones is quite ineffective. It is essential that any work done in reclaiming gullies should first be carefully planned and thoroughly understood.

Broadly speaking, gullies may be controlled by establishing a protective soil cover of grass, vines, shrubs and trees. In order to do this, it is generally necessary to construct checks of some kind in order to cause the deposit of silt and soil in which the grasses and trees may be planted. The



Erosion in an Orchard.
A gully of this type can be controlled by the use of grass sods.

banks or sides of the gully also must be sloped to an angle of repose (about 30 per cent.) before being planted with grass, shrubs, trees, etc.

Head Erosion.

The formation of gullies may result from erosion of soil in a number of different ways.

On undulating country, when all the rain cannot be absorbed, it flows off the land. The tendency is for this water to cut little tracks and gutters for itself. Water thus concentrated has the power to carry away great quantities of soil. This ability to cut away soil increases with the size and velocity of the stream, and if there is insufficient grass or other surface protection, a gully is formed. Gullies are often started by bad cultivation practices, such as ploughing or cultivating straight up and down the slope, finishing furrows running down the slope, or even driving a waggon straight up or down a slope when the ground is soft and moist, or by many other minor contributing causes.

Waterfall Erosion.

This type of erosion is often responsible for many serious gullies, and it may occur where the slope is not great. It has been known to extend over comparatively level country, as its severity depends more on the volume of water than on the slope of the land. It is caused when sufficient volume of water is concentrated to cause undermining; a cave-in occurs and the gully moves up stream. It is particularly noticeable where the surface soil overlies a sandy or soft, easily eroded type of subsoil. As such a gully extends backwards up a slope, branch gullies are formed by undermining by water running in from the sides. In this way a veritable network of gullies may be formed.

Ditch Erosion.

When water has been collected into channels, the capacity of which is inadequate to meet the requirements of heavy rains, the water cuts the sides away and enlarges the gullies. In this way huge gullies are sometimes formed, particularly on the upper portions of the watershed, where the slopes are steep and where water reaches the gully quickly. As the fall of the gully decreases down-stream, ditch erosion gradually decreases and, when the grade becomes less, actual silting instead of erosion occurs.

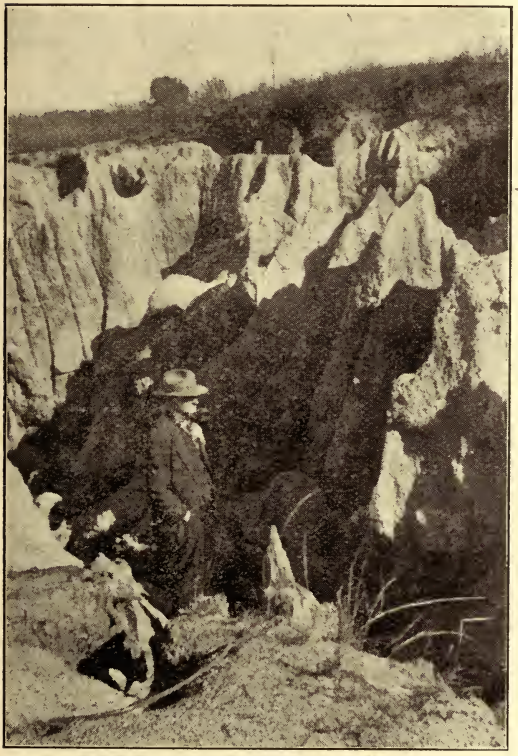
Use Preventive Methods Where Necessary.

It is obviously much easier to prevent the formation of gullies than it is to remedy them when once formed. Where the topography of the country indicates that gullies are likely to be formed, steps should be taken to prevent the commencement of gullying. A system of contour banks or furrows would be the means of avoiding the necessity for expensive work later on. Contour banks can often prevent the formation of gullies caused by head erosion, as they greatly decrease the amount of water running off, causing most of it to be absorbed by the land.

Any practices which increase the water absorption and holding capacity of the soil are of advantage. In this connection increasing the humus content of the soil by the use of cover crops and proper crop rotations, as well as contour banks, contour ploughing, and in some cases drainage, are all of great value.

In further sections of this article it is proposed to deal with various ways of reclaiming gullies.

(*To be continued.*)



Granite Soil Eroded in the Bathurst District.
Note how the branch gullies develop from the main gully.



A Deep Gully.
The result of only a small flow of water in easily eroded soil.

Germination Tests of Needlewood (*Hakea Saligna*) Seed.

The necessity for germination certificates for needlewood seed to be exported to South Africa has led to some tests being carried out recently in the Department's Seed-testing Laboratory, and the results have shown that the seed will germinate freely when given suitable conditions.

The seeds were pre-soaked and then germinated at (1) a constant temperature of 30 deg. Cent., and (2) an alternating temperature of 20 deg. Cent. for sixteen hours and 30 deg. Cent. for eight hours daily.

The following table shows the percentage results obtained in various periods from the different treatments and temperatures :—

Treatment.	At 30 deg. Cent.	At 20 and 30 deg. Cent.
1. Control—Untreated seed ...	86 in 45 days.	91 in 21 days.
2. Soaked in cold water for 16 hours	97 ,, 27 ,,	98 ,, 21 ,,
3. Soaked in cold water for 24 hours	88 ,, 24 ,,	94 ,, 21 ,,
4. Soaked in boiling water for 10 mins.	nil ,, 21 ,,	nil ,, 21 ,,

—Amy Myers, Seed Testing Laboratory.

Pure Seed.

Growers Recommended by the Department.

THE Department of Agriculture publishes monthly in the *Agricultural Gazette* a list of growers of pure seed of good quality of various crops in order to encourage those who have been devoting attention to this sphere of work, and to enable farmers to get into direct touch with producers of such seeds.

A grower's name is added to the list only (1) after the crop has been inspected during the growing period by a field officer and favourably reported upon, and (2) after a sample of the seed has been received by the Under-Secretary, Department of Agriculture, Sydney, and has satisfactorily passed a germination test.

Intending purchasers are advised to communicate direct with growers regarding the price for the seeds mentioned hereunder. In the event of purchasers being dissatisfied with seed supplied by growers whose names appear on this list, they are requested to report immediately to the Department.

Pure seed growers are required to furnish each month a statement of the quantity of seed on hand. Such statement must reach the Department, Box 36a, G.P.O., Sydney, not later than the 12th of the month.

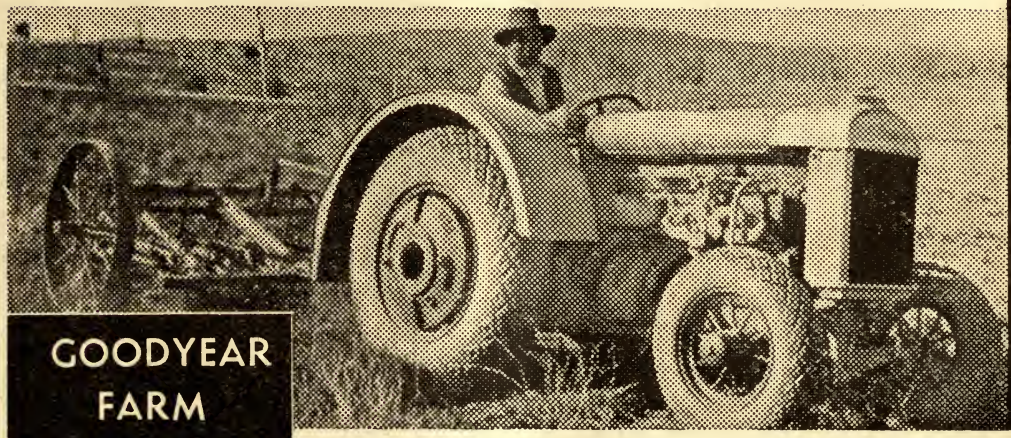
Maize—	
Duncan	A. Mottram. Numba. via Nowra.
Early Morn	E. D. Ogilvie, IlParran, Glen Innes.
Fitzroy	Manager, Experiment Farm, Grafton.
	A. Loutitt, Moruya.
Funk's Yellow Dent...	J. A. L. Thompson, South Gundagai.
	J. A. Martin, Pambula.
	N. S. Bate, Bodalla.
Golden Beauty ...	W. R. Mitchell, Lower Towamba, via Eden.
	J. G. Stitt, Taree.
Golden Nugget ...	G. Smith, Wauchope.
Golden Superb ...	J. G. Stitt, Taree.
Hickory King ...	W. J. Went, Pambula.
	W. Caffery, Pyree, via Nowra.
	J. B. Koch, Tenterfield.
Iowa Silvermine ...	E. D. Ogilvie, IlParran, Glen Innes.
Leaming	W. R. Mitchell, Lower Towamba, via Eden.
	Manager, Experiment Farm, Grafton.
Manning Pride ...	J. G. Stitt, Taree.
Manning Silvermine...	R. Lowe, Lower Portland, via Windsor.
Manning White ...	E. H. McLeod, Tinonee.
Murrumbidgee White	Elsworthy Bros., Tarabandra, via Gundagai.
Pride of Hawkesbury	J. G. Stitt. Taree.
	H. O. Cox, Kangaroo Valley.
Ulmarra Whitecap ...	J. Flanders, Ulmarra.
Wellingrove	J. T. Elliott. Dangarsleigh, via Armidale.
	E. D. Ogilvie, IlParran, Glen Innes.
Lucerne	A. H. Hockey, " Strathgled," Obley-road, Dubbo.
	S. E. Armstrong, " Olive Vale," Bingara.
	P. Morandini, " Riviera," Dubbo.
	A. H. Watts, " Elimatta," Merriwa.
Sudan Grass	C. Bennett, " Theole," Forbes-road, Cowra.
	R. Watts, Maroubra, via Muswellbrook.
	Manager, Experiment Farm, Bathurst.
Sorghum—	
White African... ...	Manager, Experiment Farm, Grafton.
	Manager, Wollongbar Experiment Farm, Lismore.
Cowper...	Principal, Hawkesbury Agricultural College, Richmond.
Tomatoes—	
Australian Earliana ...	L. E. Rippen, Coff's Harbour.
	E. Kennett, Narellan.
	Mohr and Varley, Valla.
Bonny Best	E. Kennett, Narellan.
Break-o'-Day ...	L. E. Rippen, Coff's Harbour.
	E. Kennett, Narellan.
	Mohr and Varley, Valla.
Red Marhio	L. E. Rippen, Coff's Harbour.
	Mohr and Varley, Valla.
	M. Henderson, Valla.
	H. B. Allan, Coff's Harbour.
	E. Kennett, Narellan.
Peas—	
Greenfeast	P. Morandini, " Riviera," Dubbo.

(Continued on page 597.)

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Showing how an Ordinary Stubble Burn Misses the Skeleton Weed.

Our Wheat Areas Menaced By Skeleton Weed.

[Concluded from page 486.]

L. JUDD, H.D.A., Senior Agricultural Instructor, and K. G. CARN, H.D.A., Agricultural Instructor.

The seriousness of the skeleton weed position was emphasised by Messrs. Judd and Carn in our previous issue. In badly infested country wheat production becomes impossible. First-class cultivation land rapidly deteriorates to second-class grazing country. The case was instanced of a Wagga district area which yielded 30 bushels per acre in 1930, but, as a result of skeleton weed infestation, only 10 bushels two years later, and in 1934 had to be abandoned.

In the present article it is pointed out that the weed can be economically destroyed where only isolated plants or small patches are in evidence, and eradication at this stage is urged to avoid the enormous expense and drastic changes in farm practice which must ensue upon heavy infestation. The latter demands wider rotations, competing crops such as lucerne, improved pastures, fodder cropping and outlay in sheep as partial control measures for the weed. It is emphasised that the prevention of seeding in every case, at any cost, is of paramount importance.

The Government has allocated £100,000 to assist settlers where infestation necessitates a reorganisation of farm practice, and farmers with heavily infested areas should not hesitate to apply for this assistance.

How the Weed is Spread.

Skeleton weed has two means of reproduction: (1) by seed and (2) by means of roots.

The plant is a heavy and persistent seeder, and the seeds, which are very light, are attached to a pappus which allows the seed to float for long distances. Much argument has taken place concerning the possible distances that seeds can be carried by wind, but with skeleton weed many cases of infestation are in evidence which are otherwise difficult to trace. The seeds have a high germination capacity, tests in 1935 revealing up to 65 per cent.

Under ordinary conditions seeding does not take place until well after haymaking has been completed. But where stacks are

placed in paddocks which are later allowed to seed freely opportunity is afforded for the seeds to be blown against the stack. Further, when thatch is cut from infested paddocks there is every likelihood of seeds being conveyed to the stacks and thus mixed with the chaff when the stacks are cut at a later stage. With late stripping, the weed seed is taken off with the wheat and mixed with the grain; also if wheat is stacked in the paddock for any time skeleton weed seed carried by vehicles, car radiators, clothes, etc., and travelling sheep.

Disc Implements Favoured.

In the case of roots, cultivation is the means by which they are cut off and distributed over paddocks. In this connection disc implements must be regarded as the most satisfactory, because they chop up the roots better and do not carry them any distance.



Doing Their Best to Disc a Fallow Covered with Skeleton Weed.

is likely to blow on to and adhere to the bags.

Seed Clings to the Wool.

The seed also clings to the wool of grazing sheep, and this is probably one of the most important ways in which the weed is spread. When sheep are foraging on the weed, the back and poll become covered with seed, which falls off when the animals come in contact with other brush or obstacles. Sheep from shearing to December should be free of the seed.

The use of second-hand bags is a menace and should be avoided where possible. This especially applies to seed, and no seed should be purchased from infested areas unless it is placed in new bags after grading. The weed seed is light and easily

Tests at Wagga Experiment Farm disclosed that, in dry soil, the cut-off portions of roots soon died, whilst, in moist soil, the percentages of root pieces of different lengths that grew are shown in the following tabulation:—

3 inches of root with crown 16 per cent. growth.
6 inches of root with crown 50 per cent. growth.
9 inches of root with crown 70 per cent. growth.

When the root is cut off with an implement there is always a more vigorous growth from the old root, and often two or three shoots come away from the old root where it was cut off. The plant can shoot up from a great depth compared with other



Skeleton Weed Growing along the Junee-Narrandera Railway Line.

plants, and deep cultivation is not successful in killing out the perennial root. In tests the roots have been cut down to 2 feet and the plant immediately forces its way to the surface again.

Control.

Control of the weed has two aspects:—

(1) Eradication in reasonably clean areas where infestation is not heavy nor heavy reinfestation from seed a possibility.

(2) Control of the weed in heavily infested areas by diversified systems of farming, embodying intensive stock grazing, the sowing of competing crops, the adoption of wider rotations and the development to the full of suitable side lines.

It has been argued that an effective method of eradication has not been devised, but experiments prove that the weed can be economically destroyed where only isolated plants or small patches occur. Admittedly, present known means are expensive, but when used on individual plants and small patches the cost is very small and eradication at this stage is definitely recommended in order to avoid enormous expense and drastic changes in farm practice at a later date.

It must be pointed out that the reward of £5,000 offered is for an economical and complete eradication method on heavily infested country.

Lightly infested areas are those where the weed is first appearing or occurs only in small patches.

All farmers should immediately make themselves conversant with the weed and be able to recognise it on appearance. Public displays of both young and mature plants should be arranged, and anyone having doubtful or suspected plants should immediately forward them to the Department of Agriculture for identification.

Salt for Individual Plants.

In the case of individual plants the use of salt is recommended. The plant should be grubbed with a mattock 2 to 3 inches deep and a pint of salt applied to the exposed root. A half to one gallon of water should then be poured on the salt and covered with earth to prevent stock licking it up.

Recently success has been obtained by using arsenic or sodium chlorate in the same manner. The arsenic is applied as arsenic pentoxide or arsenite of soda in a 10 per cent. solution, while the sodium chlorate is applied in crystal or 10 per cent. solution form, the latter preferably in dry weather.

Spraying with Sodium Chlorate.

Where the weed is in patches these can be eradicated by spraying with sodium chlorate.

This chemical is a very effective weedicide, but must be handled with care because of its inflammability after the spray dries.

The spray can be applied when the plants are in a rosette stage, either before the top growth is made or when a new rosette of leaves is formed after cutting the weed near the flowering stage. These periods are generally in October and March. The most effective method is to spray the foliage with a solution of sodium chlorate consisting of 1 lb. to 1 gallon of water, adding 2 oz. of glue to each gallon of spray. It is only necessary to apply sufficient to cover the foliage with the spray, as more than that quantity will fall on the soil and be wasted. Also the chlorate falling on the soil will damage fertility of the soil up to two years if a large quantity is applied and dry weather follows.

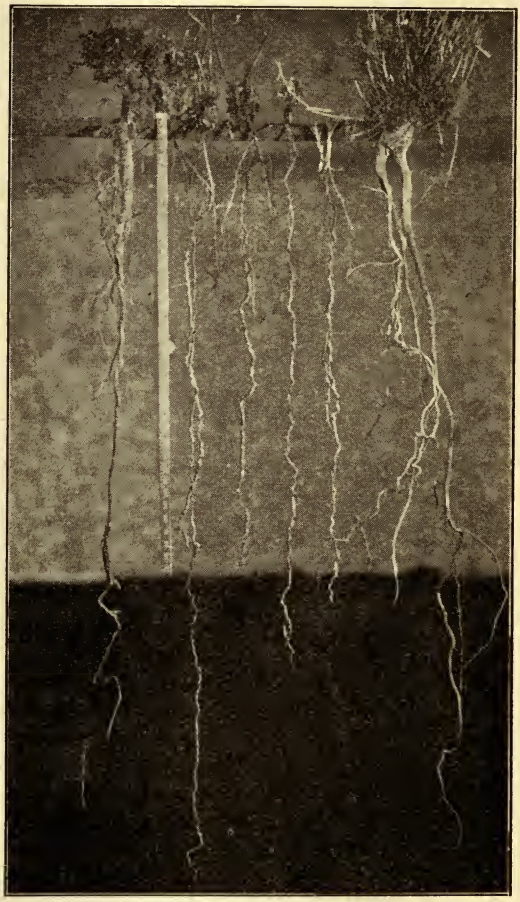
A Second Spraying Necessary.

The top of the weed will immediately die back, but destruction of the root will take some four to six weeks, and during this period the plants that accidently did not receive sufficient spray and those not above the surface at the time of spraying, will keep on growing. It is therefore necessary to spray a second time and a stronger solution is recommended for the second application. This spray should consist of 1½ lb. sodium chlorate to 1 gallon of water, and if the spraying is done in the spring a period of from four to six weeks should elapse between each spraying. In the case of the autumn spray exact information is not yet available as to time between each spraying, but probably a month will be sufficient.

Sodium chlorate is a white crystalline salt; it can be purchased from any large store or chemist, and is easily mixed by dissolving in cold water before spraying. Last year glue was added to the chlorate with excellent results. The amount added was one tablespoon to each gallon.

It has been estimated that the rate of penetration into the root system is approximately 1 foot per week when using sodium chlorate. It is therefore essential that the plant be left undisturbed for a period of 4 to 6 weeks after spraying before stocking or cultivating. The sprayed plants are salty in taste and attractive to stock, but after a month there is no danger to stock from eating the sprayed plants.

When spraying the weed a high pressure pump is preferable, but with only a small amount of spraying to be done a small bucket pump will suffice. The ordinary cone-shaped spray is not economical nor is a good penetration obtained into the foliage. The better type of spray is obtained by using special nozzles which give a fan-shaped spray. These nozzles can be purchased and fitted to any pump.



Lucerne and Skeleton Weed Roots Compared.
The two outside plants are lucerne, the others skeleton weed.

Sodium Chlorate is Highly Inflammable.

This chemical, when it dries after being sprayed on to any vegetable matter such as grass and crops, boots, clothing, woodwork of vehicles, etc., results in a chemical compound which is highly inflammable. The dry matter can then be ignited by friction or slight heat and the resultant furious fire

is difficult to extinguish. So far as is known from these tests, the inflammability exists for some four to five weeks after spraying under ordinary western climatic conditions. Should rain fall and be followed by high humidity this inflammability would be quickly reduced. Hence great care is necessary when spraying, and leather boots should not be worn under any consideration. Rubber boots that are unable to absorb the spray are necessary, while old clothes that can be destroyed or soaked in water and thoroughly washed are essential.

All spray should be mixed out in the open away from any buildings, vehicles or fires and the spray must be used and mixed in metal vessels. Wooden casks should never be used. All spray apparatus should be thoroughly washed after use, before placing in sheds. It is also a good plan to have a supply of water on hand when spraying in case of emergency.

The chemical when purchased in the crystalline form will not ignite by friction, but if a flame is applied the chemical will burn furiously. It is therefore essential to store the chemical in a dry position, preferably away from wooden buildings.

Prevention of Seed Formation.

The weed must be prevented from forming seed and this will mean good early stubble burning when the weed commences to flower.

The argument that feed is destroyed will have to be abandoned, and fodder crops grown to fill the gap if this weed is to be stopped seeding in the stubbles. Where the weed has extended to the characteristic patches the stubble fire will miss the patch as it will be quite green. In this case it is either necessary to cart old straw, such as rubbish from stacks, to these spots, or use a flame thrower to clean up the patches. A flame thrower can also be used as a spray unit on the farm.

Careful handling of sheep is essential during the seeding period and, while they should be used as much as possible to prevent seeding, they must not be allowed to spread the seed. Sheep that have been grazed on areas in seed should not be moved to clean areas until after shearing. Wethers will prove of great value in punishing the weed, without serious loss to the revenue from the stock.

The importation of stock, fodder and seed from outside infested areas must be carefully watched. Where the seeding of the weed is being controlled there is no fear from this source, but following wet summers in localities where the weed is allowed to seed profusely this source must be guarded against.

Finally in the clean areas quick action is urged if the weed appears. Should farmers act quickly and decisively they have little to fear, but once allow the weed to seed and establish itself and a lot of time, work and expenditure will be necessary.

On Heavily Infested Areas.

In paddocks that would prove too costly to spray as a means of destroying the weed, eradication will be a very slow process. In this case single crop farming is no longer possible; that is, wheat and fallow. It is suggested that this system of farming has definitely encouraged the growth and spread of the weed.

Wider rotations are necessary, including competing crops such as lucerne, better pastures including early strain subterranean clover, and fodder cropping to increase the carrying capacity of the holding. In addition side lines must be fully exploited. The adoption of rotations of this nature in an established wheat district naturally involves in many cases the outlay of considerable money on the purchase of stock, establishment of pastures, subdivision fences, and the requisite water and fodder reserves. The Government has recognised this and has already allocated £100,000, for the purpose of assisting settlers where the infestation of skeleton weed necessitates a reorganisation of farming operations. This money is available now, and applications for assistance are being received by the district Agricultural Instructor; farmers with heavily infested areas should not hesitate to apply for such assistance in an endeavour to combat the weed and maintain the earning capacity of their property.

Lucerne will Compete with the Weed.

Wagga Experiment Farm has definitely demonstrated that lucerne will compete with skeleton weed, and on private farms in the Wagga and Young districts lucerne can be seen to be taking the ascendancy and choking out the pest. Lucerne is a deep-rooted

plant and succeeds in entering the deeper layers of the subsoil similarly to skeleton weed, but once the roots are established in these lower levels the lucerne provides competition with which the skeleton weed is unable to cope. Lucerne requires suitable soil conditions to establish a good stand; it is urged that where possible, paddocks should be sown to this valuable crop before the weed has completetly taken charge. Farmers are referred to Departmental publications for detailed information concerning soil and climatic conditions affecting lucerne culture.

Suggested Rotations.

The rotations suggested embrace wheat followed by oats for fodder, hay or grain, followed by fallow, for the lightly infested land. On the heavier infested lands two years of oats or barley, fodder and hay, between the wheat and the fallow will probably be necessary. In both cases a suitable area of lucerne and an area of subterranean clover should be sown down on the property. When the lucerne has cleaned the particular area, this can then be brought under the wheat rotation and another paddock sown to lucerne. In all cases the seeding of the weed must be prevented and stubble burning follow the grain crop, and a disc implement must follow the hay crop and stubble burn if necessary.

The oats sown as fodder crops, besides providing green feed during the dormant stages of skeleton weed, will build the fertility of the land, but with this rotation the time of ploughing must be carefully watched. Following heavy stocking the land often sets very hard and ploughing later than September may be impossible; this, of course, depending on local conditions.

To Establish Lucerne Successfully.

It must not be overlooked that in establishing lucerne on infested country the lucerne is called upon to compete in the early stages with a deep rooting vigorous established plant and every assistance must be afforded the lucerne. Stocking of the young stand must be discreet, giving the crop the advantage of cultivation and renovation by adequate dressings of superphosphate. The point to be realised is that you are endeavouring to establish a competing plant and not merely produce lucerne, hence it will be realised the position is somewhat different from ordinary lucerne culture.

For the successful establishment of lucerne and subterranean clover autumn seeding is essential where the weed is established. Regular renovations and top-dressing to keep the stand vigorous and productive must be adopted. It is suggested that any farmer desiring information regarding the cultivation of such crops should communicate with the local Agricultural Instructor and have all available information before launching out on a programme involving the future success of the farm and the suppression of the weed.

Where seeding takes place the germination of the seedlings should be carefully watched and immediately cultivated. During last autumn germination of the seed resulted in a large extension of the weed, which could have been avoided by immediate cultivation. The young plant immediately sends down a vigorous taproot and it has been observed that, if cultivation does not take place before the root has been established, there is little hope of destruction by cultivation unless the farmer is fortunate enough to cultivate just prior to a severe droughty period. This taproot growth is rapid and when the top growth is about 2 inches in diameter the root has reached generally a foot in depth.

To Prevent Seeding.

The recommendations for preventing seeding in the lightly infested areas must be also directed to this country and the combination of stocking, stubble burning and spraying is applicable to the heavily infested areas. This is specially the case around headlands and fences, gardens, etc. The suggested rotation embodying pasture improvement strikes the vital note in skeleton weed control in that it makes possible the greater utilisation of sheep for the control of the weed, and constitutes, in conjunction with cultivation, the only economic method of controlling seeding. Observations in this direction have been interesting in that it has been definitely established that the spread of skeleton weed has been greatest where few or no sheep are kept on the farm.

(*Continued on page* 568.)

Australia's Primary Industries.

Their Relation to the World's Economic Position.

[Continued from page 498.]

By Sir Herbert William Gepp, Kt.

In the first printed instalment of Sir Herbert Gepp's address (see our last issue) he briefly surveyed the world's economic position, and forcibly emphasised the point that no matter how comparatively prosperous Australia seemed to be there could be no real and lasting prosperity while there still existed so much distress and poverty in other countries. Australia had to realise that her prosperity depended in the final issue upon the prosperity of the great nations inhabiting other continents.

Following the necessarily brief survey of the world's economic position, let us now consider our position in Australia, remembering that the general world position affects fundamentally the outlook for the future of primary industries and the present position of the primary producers themselves.

I recommend you to obtain a copy of the Circular of the Bank of New South Wales of the 17th June, 1935, in which comparisons are made, firstly, between the world economic position in 1932 and 1935, and secondly, between the Australian economic position in the same two years.

Economic History Does not Repeat Itself.

The survey deals with the brighter prospects at present evident, with the part played by Governments, and with the prospects of further recovery. It says it is doubtful whether recovery is the right word to use in connection with future prospects, because inevitably the question arises: recovery to what? It proceeds: "It is idle to expect the recovery will mean the return to the conditions of 1928, just as it was futile to expect after the war a return to pre-war prices and conditions. The economic world does not move in circles, and in this sense economic history does not repeat itself."

The difficulties of the situation are exemplified by the caution forced upon the responsible authorities of the Bank of New South Wales in making their survey and comment. Indeed, this well-written publication illustrates the magnitude of the problems, the intensity of the difficulties and the necessity for courage, patience and mobilisation of the best brains from all sections of the Australian nation to assist the Governments and other authorities in developing the best lines of future action.

Australia's Big Problem.

Sir Herbert Gepp referred to Australia's population as probably her greatest, yet almost unrecognised, problem.

The birthrate in Australia was 42 per thousand in 1860, 27 per thousand in 1901, 25 per thousand in 1921, 18 per thousand in 1931, and only 16.58 per thousand in 1934. . . .

For every four children born in Australia to women between 15 and 44 years in 1921, only three were born in 1933. Australia's birthrate is approximating that of Great Britain, namely, 14 per thousand, and if the present decline were to continue, in 200 years Australia's population would be one million and in 300 years only six thousand. I am not suggesting, continued Sir Herbert, that the present decline will continue, but I believe many Australians fail to realise the present tendency, and very few indeed ever think of what it implies in a world where many countries have very dense populations crowded for space.

Why the World is in Trouble.

The frailty of human nature, as viewed internationally, is undoubtedly a reason why the world is in such trouble and distress. Fear and distrust are the watchwords and the motto of the evil spirits riding the economic storm. Inaction means retrogression. Any action leading to improvements

is infinitely more difficult than action leading to intensification of the present economic or uneconomic nationalism. This idea of self-sufficiency is the poison gas which is slowly but surely destroying international trade and international security. In present circumstances, Australia's duty to itself and to the British Commonwealth of Nations and to the world in general is to think hard, to think clearly, in order to support Great Britain and the other Dominions in all actions which will contribute to the restoration of at least the necessary minimum of world equilibrium. Australia must study its own problems viewed nationally and internationally, and must take all steps which are essential to the maintenance of the morale, the efficiency and the security of the nations.

Australia's Fortunate Position.

A study of the position in Australia shows that of all the peoples in the world the Australian nation has probably the easiest task in the struggle to maintain internal equilibrium and financial integrity. Australia's resources in relation to its population are remarkable, partly owing to good fortune and partly owing to past efforts at development. Its production for export covers numerous articles which are still saleable in large quantities—gold, wool, wheat, flour, butter, and other milk products, hardwood timber, barley, fresh and dried fruits, sugar, meat, coal, lead, tin, copper, silver, and other materials. But, as I have said before, the continuance of Australia's comparative prosperity must be carefully examined against world dangers. The greater the chances of maintaining a comparative prosperity, the greater the obligation and necessity to contribute towards the solution of the world's problems. Upon this solution our security and prosperity depend.

Some of Our Problems.

Briefly, let us view some of Australia's problems, some of which are essentially internal, while others are materially influenced by world economics and "uneconomics." The following is a list of some of the more important issues facing us as citizens of the Commonwealth to-day: Financial equilibrium and rates of exchange; employment and unemployment; centralisation and decentralisation; disparities of standards of living between different sections of the community; national, scientific, and technical leadership and education; the struggle between industrial codes of hours and wages and the determination of individuals and families and small partnerships to make and sell and live; the struggle between individualism and collectivism; the question of the desirability or otherwise and the practicability of relating interest rates to cost of living; the costs of production in relation to the maintenance and extension of markets, and finally the general problem of the maintenance of the morale, efficiency and cultural standards of the nation. Whilst we have our health and strength, mental and physical, these problems are the salt of life.

What of Our Population?

Purposely, I have not mentioned in the list the subject which is probably the greatest yet almost unrecognised problem facing Australia, namely, the future of the size of Australia's population. The Right Hon. W. M. Hughes, on behalf of the Federal Government, is endeavouring to awaken the people of Australia to the picture of conditions in the future if the present decline in the birth rate continues.

Dr. S. J. Minogue, Superintendent of the Stockton Mental Hospital, recently delivered an address in Newcastle. Dr. Minogue truly says that it is of little use having a race perfect in mind and body if that race be doomed to extinction within a few centuries.

Most of you well know that what are called vital statistics include a study of births, deaths and marriages in the community, and these statistics kept regularly are checked by a census taken every ten years. These accurate vital statistics have been kept in Australia for more than sixty years. The birth rate in Australia was 42 per thousand in 1860, 27 per thousand in 1901, 25 per thousand in 1921, 18 per thousand in 1931, and only 16.58 per thousand in 1934. These figures compare with present-day birth rates in Egypt and Russia of 42 per thousand, Japan 31, Italy 23, whilst Germany, England and Sweden are at the bottom of the list with about 14.

The death rate in Australia in 1901 was 12.22 per thousand, and it has fallen to 8.92 in 1933. In 1934, 6¾ million Australians added to their number by natural increase enough individuals to give a net increase of 7 per thousand—half of what it was thirty years ago. In South Australia, which has the lowest birth rate in the Commonwealth, there were ten thousand fewer children under the age of ten in 1933 than in 1921. The rise in the average age of the population will, within a comparatively short number of years, make the pension system impossible.

Australia's Declining Birth Rate.

For every four children born in Australia to women between 15 and 44 years in 1921, only three were born in 1933. Australia's birth rate is approximating to that of Great Britain, namely, 14 per thousand, and if the present decline were to continue, in 200 years Australia's population would be one million, and in 300 years only six thousand. I am not suggesting that the present decline will continue, but I believe many Australians fail to realise the present tendency, and very few indeed ever think of what it implies in a world where many countries have very dense populations crowded for space.

A certain minimum increase in our population is essential, and in this connection any fears of an increase of unemployment due to increased population must be discounted entirely because, firstly, increased population does not mean increased unemployment if the calibre of the people is sufficiently good and, secondly, an indefinite continuance of the present unemployment position is unthinkable and impossible.

The people of Australia, and particularly those who have the opportunity of contributing to the maintenance and increase of the birth rate and who decline to do so for selfish reasons, must realise that the continuance of their rights and privileges is conditional upon the carrying out of national duties. The importance of this population problem to the primary industries of Australia is obvious; if the home market is the best market, then maintenance of the home market is vital.

Individual or Collective Production?

The next main problem I wish to bring to your notice is that of how far the individual is likely to be able, or even permitted, to remain as an independent free agent in matters of the production of goods —how far control of production on the part of the individual producer is necessary. If individualism is to be practised in the future—possibly on a steadily diminishing scale—its last stronghold will undoubtedly be the primary industries.

The question before us is the comparative balance of advantages and disadvantages between individual and collective production. Probably again the Anglo-Saxon and Anglo-Celtic race will be the last stronghold of individualism in a world tending in all probability towards collectivism. That humorous Professor Stephen Leacock has said that the genius of the British race for politics is that it always selects for discussion and argument problems that are insoluble. The inference from this paradoxical remark is that the genius of the British race is for compromise; for making adjustments which will enable its affairs and business to continue always the same but always changing.

Ill-considered Compromises Unsatisfactory.

The value of a compromise depends upon the thoroughness of the study of the

Our Task Easy, but Obligations Great.

A study of the position in Australia shows that of all the peoples in the world the Australian nation has probably the easiest task in the struggle to maintain internal equilibrium and financial integrity. Australia's resources in relation to its population are remarkable, partly owing to good fortune and partly owing to past efforts at development. Its production for export covers numerous articles which are still saleable in large quantities. . . . But, as I have said before, the continuance of Australia's comparative prosperity must be carefully examined against world dangers. The greater the chances of maintaining a comparative prosperity, the greater the obligation and necessity to contribute towards the solution of the world's problems. Upon this solution our security and prosperity depend.

discussion leading to the compromise, and the extent to which the interests of all parties have been considered. Ill-considered compromises are often sterile of results, although sometimes they have a nasty back kick in them. I suppose in the opinion of the horse and the donkey the mule is considered a sterile compromise with a back kick in it. And that reminds me of a story I read—still dealing with compromises. In New York there is a paper called *Life,* which is the American equivalent of the English *Punch*. In 1919 I came across a delightful little paragraph which read: "What was hooch? What is hooch?" It continued: "Hooch *was* anything with a kick in it made from bad whisky, gin, or any other spirits, tar, molasses, sheep-dip, and any other liquid, and exchanged with the Eskimos for skins. Hooch *is* a hybrid, that is, a compromise, which is now obtained by *crossing* the Canadian border with an automobile." I have no doubt that you gentlemen, as farmers, have experience in the uncertainty of the results of crossing experiments!

Australia's Money and Credit Compromise.

Now, accepting the view that money and credit were made for man and not man for money and credit, we, in Australia, have decided—and wisely in my opinion—against a revolutionary change touching the nationalisation of the means of credit, production and distribution. We have devoted ourselves to a policy of compromise well considered and well discussed, of placing in the hands of a select body of citizens the responsibility of deciding from time to time credit policy, the rate of exchange, and the relative value of our Australian monetary unit.

We have realised the importance of stability and of adjustments from time to time in accordance with economic circumstances. We have decided that the credit of the nation overseas must be maintained, and that that credit must be used to provide sustenance and employment for all those capable of and willing to work. We are supporting the policy that our national credit must be used, and loans raised, as and when necessary, to supplement the economic taxable capacity of the nation to achieve these objectives and to assist any section of the nation when its economic life is threatened by difficulties of markets and prices which are beyond individual, sectional, or national control.

Restriction of Production.

The great problem of restriction or control of production is ever under discussion. I suggest that no common rule can be made which will apply without reservation or alteration to each special case of this problem. Probably, comparatively speaking, the policy of the wool industry of Australia to sell regularly and steadily is wise and sound. The same principle may not apply without modifications to some of our other products, including wheat, because, while we are a majority producer of wool we are (nationally) a minority producer of wheat. It may be that the positions of butter and other milk products and of a number of other exports are intermediate between that of wool and that of wheat.

Ways Out of the Depression.

Two of the ways out of the economic morass in which the world finds itself may be briefly considered. The first is to cheapen the price to the consumer and let the industries adjust themselves to the law of supply and demand. The second is to ration the production of, and exports from, exporting countries, and possibly at the same time to "quota" the imports into importing countries.

Any surpluses *can* be absorbed in the case of people hungry and needy in a world of plenty. For some industries one of the solutions will be in the direction of disposing of surpluses at lower prices. On the other hand, if a surplus *cannot* be consumed under present financial and monetary arrangements, or under any modifications of these arrangements which are conceivably possible, then production on the present scale is futile. Restriction is then the only safe policy. Obviously, international agreement is necessary to make restriction in respect to export products effective. And the rub is that international agreements are difficult to make, and more difficult to maintain.

Laisser-faire Policy not Favoured.

The concensus of world opinion is that no real solution is to be found in the principle of *laisser-faire*. Before world-wide adjustment under a *laisser-faire* policy had taken place, other adjustments—some violent,

some more peaceful but revolutionary enough—would have been forced upon the internal structure of the nation. These might take the form of cheapening produce to the consumer; under such the exporting countries might be required to forego (by medium of levies) portion of the receipts for distribution as bonuses to the farmers of importing countries. In some such way the transition period may be safely passed.

If it be possible to gauge world opinion from a review of the steps taken by the nations to overcome the present impasse, it is clear that some form of marketing control is considered essential. Opinion on the form of effective support for agriculture varies widely—from the Russian collectivism of the Kohlkoz farm to the British systems of guaranteeing prices, quotas, and subsidies. Production can be rationed by allotting quotas, by issuing licenses for the growing of crops, and by restricting areas to be cropped. The system might involve rationing each farmer, either by quantity or area, and the refusal of a ration to uneconomic or inefficient farms or farmers.

Of course, rationing is hedged about with difficulties. The control which is possible in industry is not always applicable to agriculture. For instance, hours of labour can be fixed and enforced without much difficulty in industry. But in agriculture the case is very different; seasonal demands, the care of livestock, the existence of so many owner-workers, and the extreme difficulty of policing any such legislation, forbid many of the straight-jacket restrictive methods possible in industry.

Economic Nationalism is the Poison Gas.

The frailty of human nature, as viewed internationally, is undoubtedly a reason why the world is in such trouble and distress. Fear and distrust are the watchwords and the motto of the evil spirits riding the economic storm. Inaction means retrogression. Any action leading to improvements is infinitely more difficult than action leading to intensification of the present economic or uneconomic nationalism. This idea of self-sufficiency is the poison gas which is slowly but surely destroying international trade and international security.

Guaranteed Prices for Primary Products.

The principle of guaranteed prices is one of the many palliatives tried in importing countries faced with the destruction of their own agriculture by the flood of imports available, but this principle brought retributive evils in its train. England has found that one of the results of guaranteeing a minimum price is that the farmers rush into the production of the guaranteed commodity and intensify the difficulty of supporting the guarantee. The farmer, confronted with various things he may do, and various crops he may sow, is biassed towards, and irresistibly drawn to, the guaranteed commodity to the production of which no risk other than that of the season is attached.

The stabilisation scheme inaugurated by the English Wheat Act resulted in a considerable increase in the acreage sown to wheat. Similarly, the administrators of the English Milk Marketing Scheme were faced with an excess of milk 20 per cent. over England's liquid milk requirements in the first winter of their operations, and in the following summer the excess rose to 40 per cent. Encouraged by the prospect of the guaranteed price, those mixed farmers who had also been stock fatteners had increased their herds of milking cows. When the marketing scheme for potatoes was instituted in England with protection against

Is the World's Monetary System Sound?

Another great question to which time has not permitted me to draw detailed attention is the problem of the world's monetary system. Is the system sound? Is it capable of meeting the demands of the present and future situations? Is it the system that is mainly wrong, or is it the application of the system which is incorrect under present circumstances?

[This will be the opening subject dealt with by Sir Herbert Gepp in the third instalment, which will appear in our next issue.]

imports during part of the year, it was found necessary to restrain farmers from sowing additional acres under a penalty of £5 levy per acre so planted.

If we are to be rationed in Australia and marketing control with guaranteed prices established for primary products which are at present free, we must apply the lessons taught us by English experience. It will be necessary to guard against making the edifice top-heavy, or our last state will become worse than the first.

Guaranteed Prices and Quality.

There are other dangers that must be foreseen and guarded against. For instance, the farmer who, under a controlled marketing scheme maintains the quality of his product at the level at which competition has previously compelled him to aim, must be amply protected from his less scrupulous neighbour who aims at quantity rather than quality. Premiums must be paid for superior products, and dockage enforced against the inferior article. Further, the wants of the market, particularly its special wants, must be studied all the time.

If guarantee implies restriction, as it must do, or if it demands quality, as fairness requires, farmers must be prepared to submit to a considerable amount of inspection and control. They must realise that such evils are inevitable in the greater advantages sought.

Eternal vigilance is the price of security in a marketing scheme as much as in national defence.

Close Co-operation Essential.

Farmers must also be prepared to take broad views. Their occupation makes them individualists, but, if marketing control is to solve their pressing economic difficulties, there must be a strong infusion of the true co-operative spirit into the body supporting the marketing authority. To help the farmer in his co-operation, this authority must ensure, and in these days of quick easy publicity it *can* easily ensure, that the farmer is in possession of all the information necessary for the intelligent, reasoned performance of his part in the new scheme of things. Destructive criticism, based on grievances, which are often imagined, is too easy.

My next point is that we must not be impatient. We have to realise that if we are of the world, and trade with the world, and export our products, we cannot avoid considering the interests of producers in other countries. That is the reason why I spent so much time just now in discussing the aspects of the world agricultural problem rather than that of Australia alone. Obviously, no immediate solution of the problems, either of the world or of Australia or of the primary industries of Australia, is apparent. We have to face facts, analyse the situation continuously, modify and adjust as circumstances dictate and as judgment decides.

The real economics of a nation must be based upon the soundest possible judgment of the economic position of each of its sections, having due consideration for the interests of all the others. If the real economics of a nation are not determined upon such grounds as will contribute steadily towards the improvement of the spiritual, mental and physical calibre of the nation individually and collectively, then what may, for the time being, seem to be progress is really retrogression.

If necessary the national credit must be drawn upon to achieve the essentials just mentioned; and provided there is progress on sound and proper lines such use of credit does not matter in the end. Whilst the present world feels and argues, and possibly fights, its way towards some better state of affairs, Australia, as a unit, should keep ever before it the maintenance of its own morale.

(*To be continued.*)

The Distribution of Skeleton Weed—A Correction.

ON the map on page 483 of our September issue Pallamallawa and Warialda are shown as centres where skeleton weed had been found growing. This is incorrect, plants of chicory having been mistaken for skeleton weed.



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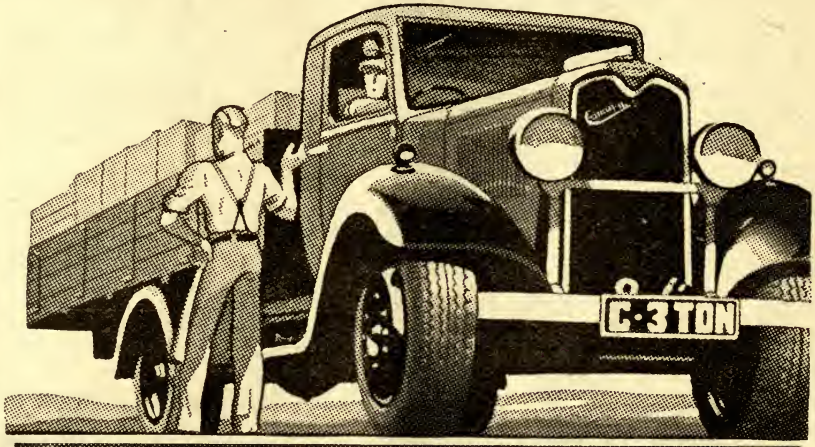
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During recent years the value of pasture improvement as reflected in improved health of stock has been strongly advocated, and an experiment conducted on the property of Colonel H. F. White, Bald Blair, Guyra, during the Winter and Spring of 1934, and described in the following article, supplies further proof of the benefits to be derived from improved grasslands.

It is known that sheep heavily infested with the smaller Trichostrongyles show lack of growth, consequently one of the principal objects of the trial was to ascertain whether the maintenance of improved nutrition would overcome the effects of the worms, namely, loss of weight.

One Aspect of Trial Inconclusive.

From this point of view the experiment was not conclusive. Though the sheep in both paddocks carried a fairly heavy infestation with worms at the commencement, this fell markedly during the first eight weeks and remained light during the subsequent five months of the trial. For this reason it would appear that parasitism had little effect upon variation in body weight during the greater part of the trial. The sheep on both areas received monthly treatments with copper sulphate, and although this would materially reduce the numbers of *Haemonchus contortus* in the abomasum, we know from earlier experience that this drug, and numerous others which have been tested, have only a very slight effect upon the worms in the small bowel. Therefore, while the monthly copper sulphate treatment would reduce the infestation slightly, it cannot be contended that the drenching was responsible for the diminution in the infestation, as the worms present were other than *Haemonchus contortus*.

This drop of parasitism is not without significance, as from previous experience of the smaller Trichostrongyles in young sheep it was expected that a decline in infestation would not occur during at least the first four months of the trial. As the sheep carried many parasites with them to both areas, these worms might have been expected to so foul the pastures that continued reinfestation would occur. It would appear, however, that either (*a*) adequacy of nutrition of both paddocks allowed the sheep to throw off the parasitism, or (*b*) that the climatic conditions were not in favour of reinfestation of sheep from these areas. The winter in the district in question is a hard one, and whilst both of these factors probably played a part, it seems likely that the influence of (*b*) was the greater.

Interesting information is available in another direction, namely, as to the relative value of improved and unimproved pasture in supplying the nutritional needs of young sheep.

Details of the Trial.

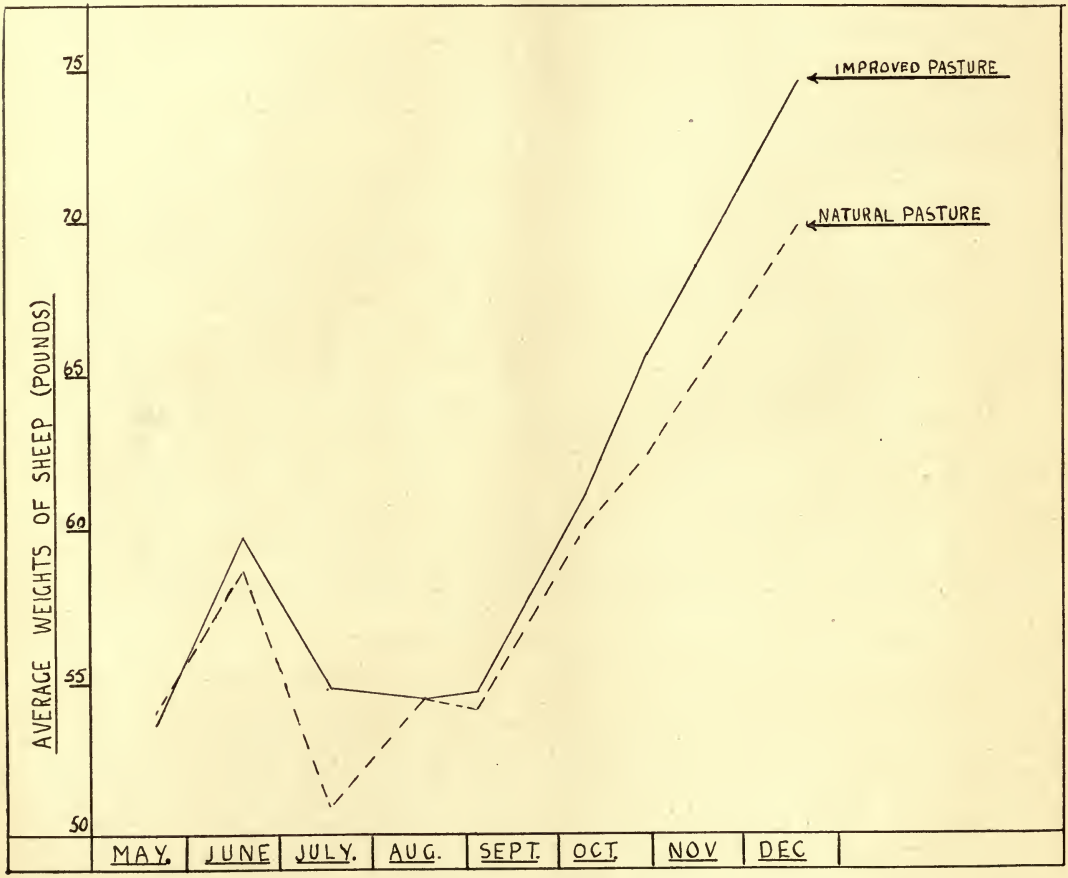
The experiment commenced in May and terminated in December. During May and June and the early part of July unusually dry conditions prevailed, but for the remainder of the trial good seasonal conditions were experienced.

The trial was conducted upon two groups of Corriedale-Merino crossbred weaners of the same age, namely, seven months at the commencement of the trial. One group was depastured upon natural New England pasture which had been well managed prior to the beginning of the trial, while the second group was grazed in an improved paddock which had been originally put down in 1914 with *Phalaris tuberosa* and trefoils and had been manured and renovated from time to time. It was last manured three years previously.

Monthly observations were made upon the sheep in both paddocks throughout the

course of the trial, which was in progress for thirty weeks. The sheep were weighed and observations conducted upon the degree of infestation with intestinal parasites, while chemical analyses of the pasturage from both padocks each month indicated how the mineral and food constituents of the pasturage varied and indicated the plane of nutrition of the experimental animals during the course of the trial.

GRAPH Showing Relative Increases in Body Weights on Improved and Unimproved Pastures.



The Paddocks Compared.

The three paddocks used were heavy basalt country and adjoined each other. In contour they were almost flat, excepting that the unimproved paddock included a slight rise and was somewhat low-lying at one end.

The unimproved paddock (A) was of an area of 40 acres and was representative of natural New England pasturage, consisting principally of kangaroo grass, wild sorghum, blue grass, tussocky poa and danthonias, and, at the commencement of the trial, a small proportion of clovers.

The improved paddock (B) was of a total area of 40 acres, 38 of which had actually been sown, the remaining 2 acres being very stony ground. The pasturage was principally *Phalaris,* rye grass and clovers. The area had been unstocked during the summer and was cut for hay in March.

A run-off paddock (C) of 40 acres, utilised with the improved paddock, adjoined it and was similar to the unimproved paddock (A) and carried a very heavy growth of kangaroo grass, wild sorghum, blue grass and tussocky poa, and therefore

contained too much tall feed and tussocky growth. It had been unstocked during the summer and, as subsequent events showed, this was a mistake. The pasture management of this paddock prior to the trial had not been satisfactory.

The feed on the unimproved run-off from the improved paddock, not having been grazed for some months, was tall and coarse and at the time of the trial markedly frost bitten, with a low proportion of danthonias and clovers. It was not relished by the sheep, which, therefore, during the greater part of the trial congregated on the improved area. This occurred to such an extent that the improved area can be regarded as carrying almost all of the sheep during the trial period.

Stocking.

The following table shows the monthly stocking of each of these areas:—

Month.	Sheep Carried.	
	Unimproved paddock.	Improved paddock (plus run-off of unimproved).
May	80	400
June	80	400
July	60	305
August	70	227
September ...	70	227
October	90	329
November ...	90	413
December ...	90	413
Average stocking	78	328

The unimproved area carried an average of seventy-eight weaners and the 40 acres of improved (plus 40 acres unimproved but little used), an average of 328 weaners during the trial period of thirty weeks. In calculating sheep run per acre, however, it must be realised that these 328 sheep were carried almost entirely by the 40 acres of improved country.

Increase in Weight of Sheep.

At the end of the trial the weaners on the unimproved pasture showed an average gain of 15.9 lb., and those in the improved paddock 21.14 lb., a difference of over 5 lb.

Taking total increased sheep weights, the unimproved area produced 1,240 lb., whereas the improved area produced 6,934 lb. Assuming, as we have every reason to do, that at least 90 per cent. of the production for the improved area was due to the 40 acres of improved country (leaving 10 per cent. for the 40 acres of unimproved run-off), it will be seen that the net production per acre for the unimproved area was 31 lb., and for the improved 132 lb. of "sheep."

More Wool Produced.

Towards the end of the trial both lots of sheep were shorn and the average weight of wool cut by each lot obtained. The sheep from the unimproved paddock cut on an average 7.14 lb. of wool, and those from the improved paddock 7.77 lb. wool, a difference of 0.63 lb. Thus, considering the increased carrying capacity of the improved area, namely, 250 weaners in excess of the unimproved area, it has been calculated that the improved area produced 157.5 lb. more wool than the unimproved area.

Explanation of Results.

In seeking an explanation for the markedly increased production from the improved paddock as against the unimproved paddock, it was seen from the results of the pasture analyses that the mineral (phosphorus and calcium) and protein content of the improved paddock was always considerably higher than in the unimproved paddock.

Phosphorus is a very essential constituent in the normal development of the young growing animal, and the beneficial effect of an adequate quantity being available to young sheep was very apparent in this trial. The analyses also showed that the percentage of lime and crude protein was higher in the improved than in the unimproved paddock.

Comments on the Rate of Stocking.

The monthly stocking was based on the judgment of the owner as to the anticipated carrying capacity, and altered from time to time as considered desirable, bearing in mind particularly the appearance of the paddocks and of the sheep concerned.

During the early winter (May and June) the rainfall was light and the heavier producing sown grasses suffered thereby. As a result the nutritive value of the pasturage

as disclosed by analysis declined and this was reflected in loss of weight by sheep in both groups, from which it can be concluded that during this period both areas were overstocked. In July, however, the nutritive value of the pasturage rose and this progressively increased during the spring and early summer, due to the very good falls of rain during that period.

From July on the unimproved area, as judged by analysis of pasture and growth of sheep, was at no time overstocked, while the fact that the body weights of the sheep in the improved area remained practically stationary from July to September, though the feed rapidly became much richer in both crude protein and phosphorus, suggests that this area was overstocked during this time, as the sheep only maintained their weight. Nevertheless, the improved area did carry these sheep, and so rapid was the response made by them during the last three months of the trial that they eventually outstripped the animals on the unimproved area, though at that period the stocking of the improved area was heavier than at any other time.

It is thus seen that the unimproved area was rather more favourably treated as regards stocking than the improved area. Nevertheless, this experiment shows the very considerable advantage accruing from the use of improved pasture.

Our Wheat Areas Menaced by Skeleton Weed.

(*Continued from page* 558.)

Cultivation results in the weed making a continued vigorous growth which is readily eaten by sheep and the plant can be maintained in this manner in its most palatable form and seeding prevented. With pasture improvement in its early stages the problem is not so simple, and the use of the mower will be necessary to control seeding and prevent the plant attaining the advanced and unpalatable form.

This type of rotation, with reduced wheat acreage, makes possible the development and efficient conduct of side lines, resulting in turn in a more balanced type of agriculture, where hitherto the extent of the wheat acreage had not allowed of either time or labour for such side lines as dairying, pigs and poultry. Summarised, the order of farm routine is changed and sheep raising replaces wheat as the major operation of the property.

In the heavily infested areas the shires, pastures protection boards and railway authorities must be asked to combine in an effort to prevent the weed from seeding. The weed is growing on many roads and in some cases along the railway line, and to these authorities spraying with chemicals will prove most efficient and successful. In all classes of infestation the point of paramount importance is the prevention of seeding of the weed at all costs.

Agricultural Societies' Shows.

SECRETARIES are invited to forward for insertion in this list dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Box 36A, G.P.O., Sydney, not later than the 15th of the month previous to issue. Alterations of dates should be notified at once.

1935.

Narrandera (J. D. Newth)		... Oct. 1, 2	
Goolgowie (J. W. Parsons)		... „ 2	
Ardlethan (E. C. Knight)		... „ 2	
Bribbaree		... „ 2	
Deniliquin (P. Fagan)		... „ 2	
Walbundrie (H. G. Collins)		... „ 2	
Leeton (E. C. Tweedie)		... „ 8, 9	
Corowa (H. G. Norton)		... Oct. 8, 9	
Ariah Park		... „ 9	
Griffith		... „ 15, 16	
Illabo		... „ 16	
Cootamundra		... „ 22, 23	
Lismore (H. Pritchard)		... Nov. 19 to 22	

1936.

Guyra (A. W. Everett)		... Feb. 18, 19	
Yass (S. C. Sleeman) ...		... „ 25, 26	
Moss Vale (H. Richardson)		... Mar. 5, 6, 7	
Maitland (Montie Brown)		... Mar. 4 to 7	
Gresford (A. R. Brown)		... „ 27, 28	

Jetting and Crutching

For the Control of Blowfly Strike.

A Comparison at Trangie Experiment Farm.

R. N. McCulloch, B.Sc. Agr., Assistant Entomologist, and K. R. Howe, H.D.A., Assistant Sheep and Wool Instructor.

At Trangie Experiment Farm during the 1934-35 season, an experiment was planned with a view to showing the respective values of (1) jetting as often as required, and (2) crutching as often as required, for the protection of a flock of ewes from fly "strike" from shearing to shearing.

It was presumed that this would mean their protection for the duration of the spring and autumn "fly waves," heavy strike being rather unusual at Trangie in summer and winter. The whole test flock was to be crutched, in accordance with the routine adopted at the farm, at the end of February.



Jetting Sheep in an Improvised Race.

Methods of Treatment.

Fly activity became noticeable suddenly, in the middle of October. A flock of 736 ewes of mixed ages (none aged) was divided into three groups, arranged after careful sorting to include proportionate numbers of both "susceptible" and "insusceptible" types. The numbers in each group and the treatment administered were as follows:—

Group 1.—220 jetted 17th October with calcium arsenite 10-10-1-100.

†Group 2.—220 jetted 27th October with calcium arsenite 10-10-1-100 and Bordeaux mixture.

Group 3.—296 crutched 19th October (fifty-four were seen to be struck).

The flock received no further treatment until 15th November, twenty-nine days after jetting. A thorough examination then gave the followings results:—

Group 1 (jetted).—29 "touched," 3 "moderate" strikes.

Group 2 (jetted).—30 "touched," 3 "moderate" strikes.

Group 3 (crutched).—No strikes.

An examination in the yard had given the impression that 1 to 2 per cent. of the jetted groups were struck. The large number "touched" was found by looking at the stained sheep individually in a branding race.

It was decided not to dress any of the jetted sheep but to re-jet thirty-eight days after the first treatment. Groups 1 and 2 were accordingly jetted for the second time on 24th November, one mixture only (calcium arsenite 10-10-1.15-100) being used. No count of strikes was made at the second jetting.

Fly activity on the farm became much

* Ten pounds white arsenic, 10 lb. stone lime, and 1 lb. caustic soda per 100 gallons water. For method of preparation see page 579.

† Bordeaux mixture at the rate of 3 lb. bluestone and 2½ lb. stone lime per 35 gallons was added to the calcium arsenite mixture for the treatment of one group. It was considered possible that arsenic might be lost from a wet fleece soiled by organic matter through the development of the fungus *Penicillium* and that a fungicide might increase the efficiency of a jetting mixture. No improvement was shown in this test.

less evident during December, and in the flock under consideration only four sheep were dressed, three on 19th December and one on 7th January (all in Group 3). By the time of general crutching, which took place on 26th February, strike was becoming slightly more obvious again and the cases dressed on the crutching board (none bad) were eight, nineteen and fourteen in Groups 1, 2 and 3 respectively. No other difference in the health of the sheep in the three groups could be observed.

Of more value probably, for purposes of comparison, is the opinion of the wool-selling company's wool expert that extreme shortness of staple is a marked disadvantage in stained wool. He considered that large lots of the longer jetted wool would have brought a considerably higher price per pound than would similar lots of shorter material (averaging three months' growth), although the latter would actually be cleaner.

The cost of the operation of jetting varies greatly with the efficiency of the plant em-



Another Jetting Scene.

Note the upward direction of the jet in the crutch.

Dry conditions during the autumn were associated with very low fly activity, and the part of the experiment planned for the second half of the season had to be abandoned.

Wool Value and Operation Cost Comparisons.

An attempt was made to compare repeated jetting with repeated crutching from the point of view of cost of treatment and loss in wool value (if any) as well as that of protection afforded. The crutchings from the various groups (two lots from Group 3) were therefore offered for sale separately. The lots, however, were so small that they could only be sold in one unit, and pieces and stained pieces from jetted and crutched sheep actually brought the same price per pound. The greater weight from jetted sheep (owing to the much heavier staining of the longer wool) resulted in those groups returning 0.4d. per sheep more than did the crutched group.

ployed and the resultant speed. Material, if calcium arsenite is used, will, on the average cost $\frac{1}{8}$d. per sheep per jetting. If two men can muster and jet 5,000 sheep with calcium arsenite in a week (which represents a speed below that attained on many stations) the cost will be slightly less than $\frac{1}{2}$d. per sheep per jetting for labour and materials.

The cost of crutching after mustering has been done may, under contract conditions, be said to average 1$\frac{1}{4}$d. per sheep.

General Conclusions.

It may be said that two jettings carried Merino ewes through the spring period of fly activity at Trangie in 1934 without the need for hand-dressing. The practical protection afforded by one crutching, done as soon as "strike" showed up, was only very slightly less complete. Although no group could be kept untreated as a control, the fact that 18 per cent. of the flock were

[Continued on page 584.]

Downy Mildew of Beetroot

A Disease New to the State.

C. J. Magee, M.Sc., B.Sc.Agr.,
Plant Pathologist.

An outbreak of this disease occurred recently in a market garden near Sydney, approximately 25 per cent. of the plants in the crop being affected. Apparently this is the first time the disease has made its appearance in New South Wales, and there is evidence of its introduction into Australia in imported seed.

The disease is caused by the parasitic fungus *Peronospora schachtii,* which, in addition to beetroot, is known to attack sugar beets, mangels, Swiss chard, wild beets (*Beta maritima*) and several other *Beta* spp. This fungus is distinct from that which attacks the related weed, Fat Hen (*Chenopodium album*).

Appearance of Diseased Plants.

The fungus may attack plants in all stages of development and establishes itself in the leaves and crown of the plant. Inflorescences of seed-production plants are also subject to attack. Spores are produced abundantly, and later resting spores (oospores) are formed in the tissues of diseased plants.

The symptoms of the disease are very striking (Fig. 1). The young heart leaves of beetroot appear to be most susceptible, and in a late stage of the disease the centre of the plant consists of a rosette of distorted leaves which may be completely covered with a downy, buff-grey coloured coating of the fructifications of the fungus (Fig. 2). In the case of light infection, only portion of the leaf blades may be attacked. The presence of the fungus apparently acts as a stimulus to the production of new leaves, which emphasises the rosetted appearance of diseased plants.

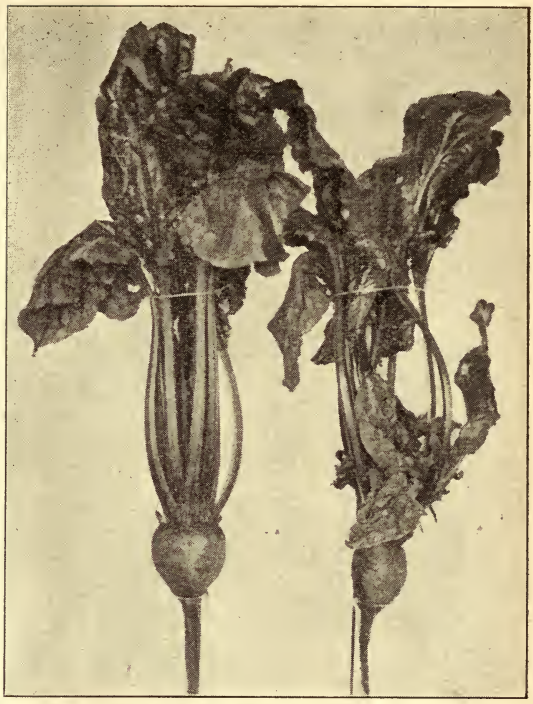


Fig. 1.— Healthy Beet Plant and Plant affected with Downy Mildew.

The plants are the same age. Note the rosetting of the heart leaves and the reduction in size of root of the diseased plant.
[*Photo by P. R. Maguire.*

Its Economic Importance.

In those parts of the world where beet downy mildew is well established, it fluctuates in importance from year to year in much the same manner as late blight of potatoes does in New South Wales. This is mainly the result of seasonal variation in weather conditions, as high humidities in spring and autumn months are favourable to the development of both diseases. In certain years heavy losses have occurred in sugar beet crops in both Europe and U.S.A. and in 1929 an epidemic of the disease destroyed over 40 per cent. of the beetroot seed crop in Central California, while certain individual crops were entire failures.

In New South Wales beetroot is grown largely in market gardens under irrigation, and it seems probable that significant losses will occur wherever the disease is introduced. Even though prolonged periods of high humidity have not prevailed during the present season the disease has caused heavy loss in the crop in which it was first observed. Losses occur from death of seed-

lings and more mature plants and from the reduction in size of marketable roots (Fig. 1).

A Seed-borne Disease.

It has been shown by experimental and commercial field plantings that downy mildew may be transmitted by the seed. Beet



Fig. 2.—Beetroot Leaves affected with Downy Mildew.
Showing downy growth formed by the fructifications of the fungus.

"seed" is actually a seed-ball containing two or more seeds held together in a "husk," which is subject to infection on the mother plants. Resting spores (oospores) of the fungus may be formed in this husk, and these are believed to be the chief means by which the disease is transmitted to the progeny.

Leach[1] has shown that approximately 1 per cent. of seeds from diseased plants give rise to infected seedlings, but the large number of centres of infection in the present outbreak of the disease in New South Wales suggests a much higher degree of seed transmission. Examination of the seed lot from which the diseased crop was grown showed the presence of an abundance of oospores of the fungus.

Control Measures.

On account of seed-transmission of downy mildew, plantings should be made with seed from disease-free sources. It is probable that owing to the production of resting spores (oospores), land on which a diseased crop is grown becomes infested. No evidence is available as to the longevity of oospores in the soil, but it is advisable to avoid planting beets in such land for as long a period as possible.

To check the spread of the disease once it has made its appearance in a crop, spraying with Bordeaux mixture (2—2—10) is practised by some growers, but no data are available regarding its effectiveness.

References.

[1]LEACH, L. D.—
Downy Mildew of the Beet caused by *Peronospora schachtii* Fuckel. *Hilgardia* 6: 7, 203-251. 1931.

[2]SALMON, E. S. and W. W. Ware.—
Downy mildew of mangold and beet. *Jour. Min. Agr.* 32: 833-838. 1926.

Results of Recent Chick Sexing Examination.

THE following candidates were successful at the chick sexing examination held under the supervision of the Department of Agriculture at Parramatta recently:—

First-class Standard—

Mr. C. R. Badman.

Second-class Standard—

Miss M. Heath.
Mr. J. R. Kilborn.
Mr. S. Leach.
Mr. S. Martin.
Mr. C. A. Muddle.
Mr. W. A. Sewell.

The Woolly Aphid Parasite.

Effect of Orchard Sprays on Aphelinus mali.

N. S. NOBLE, M.Sc., B.Sc.Agr., D.I.C., Assistant Entomologist.

OWING to the effectiveness of the parasite *Aphelinus mali*, in the control of the woolly aphid (*Eriosoma lanigerum*), spraying for this pest in New South Wales is generally no longer necessary.

During the year, and particularly during the summer months, a number of different sprays are applied to apple trees for the control of various insect pests and fungous diseases. These sprays include nicotine sulphate, various miscible oils, and lime-sulphur and the present series of laboratory experiments was undertaken to test the effect of such insecticides on the parasite, *Aphelinus mali*.



Galled Apple Twigs Bearing Parasitised Woolly Aphids.

Plan of the Experiment.

In the first place it was necessary to determine the stages of the parasite present and the percentage of parasitised aphids on the twigs to be treated, and from an extensive series of heavily infested twigs received from Armidale in February, 1934, three twigs were taken and 150 aphids on them were dissected and examined, with the following results:—

Number of parasite eggs	1
Number of parasite larvae—	
Immature...	94
Mature	13
Total	107
Number of parasite pupae—	
Unpigmented	25
Pigmented, almost ready to emerge	17
Total	42

Percentage of parasite eggs ...	0·67
Percentage of parasite larvae ...	71·33
Percentage of parasite pupae ...	28

It will be seen that there was 100 per cent. parasitism and that 28 per cent. of the total parasites were in the pupal stage. Of the total of 150 aphids examined fifty-nine or 39.33 per cent. contained either mature larval or pupal parasites.

The remainder of the twigs was divided into seven batches, each of which appeared to be infested with approximately the same number of aphids. In order to get some idea of the variation in the number of aphids on the twigs, those on two of the batches, which were retained as controls, were counted. One of these (Control A) was infested with 400 aphids, and the other (Control B) with 354 aphids, thus indicating that there was some variation in the numbers of aphids in the various batches of twigs. The aphids on the treated twigs were not counted.

The Results of Spraying.

The twigs to be treated were placed in a retort stand and were thoroughly sprayed with the aid of a hand atomiser. They were allowed to dry and then were placed in jars covered with cheese cloth, and the adult parasites which later emerged were removed periodically and counted.

The results are set out in the following table:—

EMERGENCE of *Aphelinus mali*, from Treated Twigs.

Treatment.	Total Parasites Emerging.
Miscible White Oil (1-40)	196
Nicotine sulphate (1-600) + soap (1 lb. to 25 gallons)	286
Nicotine sulphate (1-800) + soap (1 lb. to 25 gallons)	212
Nicotine sulphate (1-600) + miscible white oil (1-200)	220
Lime sulphur (1-35)	285
Control A (Untreated)	245
Control B (Untreated)	179
Totals	1,623

From the above table it will be seen that in the case of all spray treatments the number of adults emerging was greater than the number of adult wasps emerging from control batch B, while in some cases the number of adult wasps emerging from treated twigs was greater than from either control batches A or B.

It is evident that the various sprays used had little or no influence on the emergence of the parasites. That there was some variation in the numbers of wasps emerging from the various treated batches is evident, but this also applies to the controls; it will also be seen that more adult wasps emerged from aphids sprayed with nicotine sulphate 1-600 than from those sprayed with nicotine sulphate 1-800. It appears much more likely that the differences in the total number of adult parasites emerging was due to the variation in the number of aphids present on the twigs.

Of the total of 1,623 parasites which emerged, 1,453 did so during the first seven days after spraying, but parasites continued to emerge daily, in small numbers, from aphids from all batches of twigs up to seventeen days after spraying. According to Lundie[1] in summer the pupal stage of *Aphelinus mali* occupies six to seven days. Thus, it is highly probable that though most of the parasites which emerged were in the pupal stage at the time of spraying, some which were only in the larval stage at that time were able to complete their development and emerge as adults.

Under Field Conditions.

These spraying tests in the laboratory cannot be assumed to indicate precisely the results which will occur in field spraying. It is known that a number of overlapping generations of the parasite occur throughout the year, and that at any given time during the summer months, eggs, larvae, pupae and adults of the parasite may be expected to be present. If a contact spray is applied at this time to control some pest or fungous disease, it will doubtless kill a percentage of the adult parasites present on the trees.

Unlike the adult parasites the aphids are unable to escape readily from the spray, and in consequence a larger percentage of the latter would be expected to be destroyed by the spraying. Moreover, it is considered that the spraying would kill a larger percentage of the younger aphids which are not so likely to be parasitised. It is possible, therefore, that the proportion of unparasitised aphids killed would be greater than the proportion of adult parasites destroyed and that the ratio of parasites to hosts would be increased.

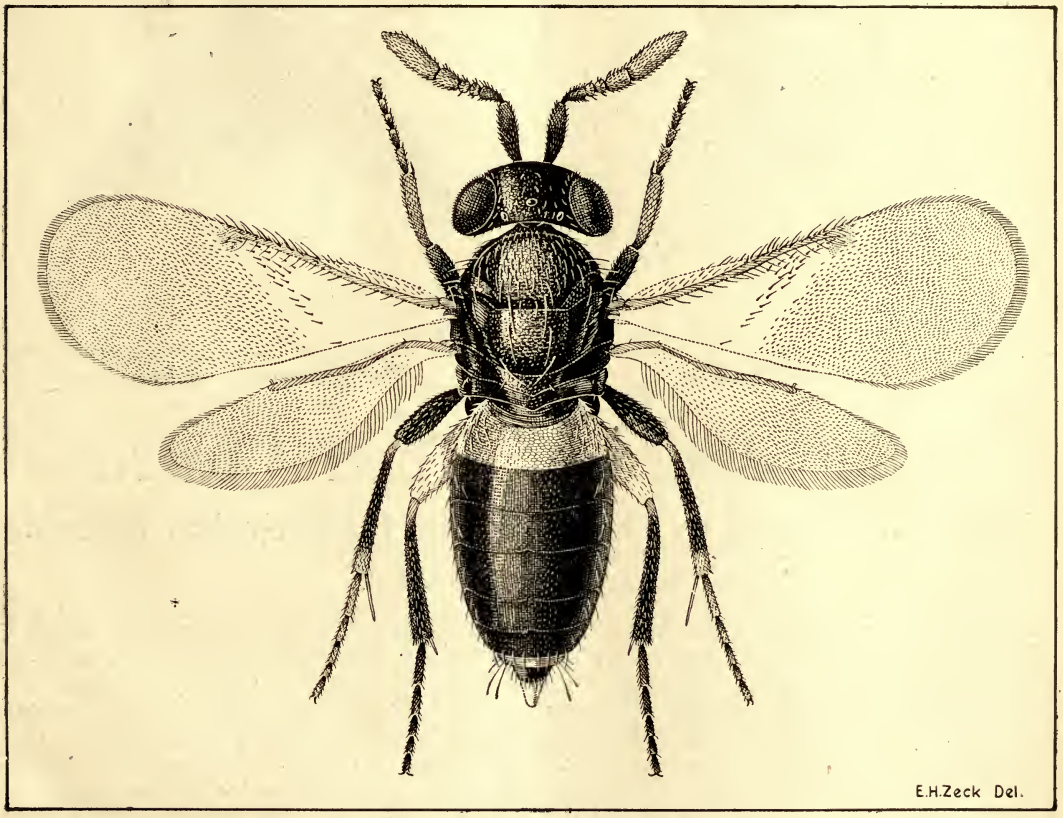
Moreover, the spraying tests have shown that mature larval and pupal parasites within the dead bodies of aphids are not destroyed, and their emergence later could be expected to further increase the ratio of parasites to hosts.

The foregoing discussion concerns only orchards where the parasite is definitely established. Where it has only been recently introduced, and spraying the trees with a contact spray to control some other pest becomes necessary, then unless the parasite has had time to oviposit and its progeny are at least approaching the mature larval stage, the spraying would probably result in failure to establish the parasite. For this reason it would be inadvisable to spray the trees in which parasites had been liberated.

When a Thrips Outbreak Occurs.

In the case of a spring outbreak of thrips, in which an orchard is sprayed or dusted at frequent intervals, every few days, over a period of several weeks, with various contact insecticides, it is conceivable that most of the adult wasps emerging throughout that period will be destroyed soon after hatching, and oviposition by the parasite will thus be materially affected. Moreover, such sprays or dusts would be directed

mainly on to the blossoms and could not be expected to destroy many of the woolly aphids on the stems, where they are protected by their woolly covering. As a result the proportion of parasites destroyed would be expected to greatly exceed that of the aphid host, and in this way the balance would be upset and the aphids would tend to get out of control. This was borne out by field observations in the spring of 1931 when a severe plague of *Thrips imaginis* was followed by a marked increase in woolly aphid numbers in some areas.



The Woolly Aphid Parasite, *Aphelinus mali*.

The Saving of Prunings in Winter.

According to *Lundie*[1], when the parasite kills an aphid, a liquid oozes through the body wall and hardens and attaches the aphid firmly to the twig.

In New South Wales the parasite mainly spends the winter as a mature larva within the body of the aphid, and in the late winter and early spring passes into the pupal stage.

At pruning time twigs bearing aphids are removed from the trees. The parasitised aphids at this time are dead, and are firmly attached to the twigs and are sheltering either mature larval or pupal parasites, depending on the time at which the pruning is carried out.

The twigs also bear numbers of unparasitised aphids, and provided the twigs are removed from the vicinity of the trees, these aphids are prevented from again crawling up the trunks and will eventually die of starvation. The parasites within the aphids will be unaffected and will later emerge in a normal manner, so that by keeping prunings in this way, the orchardist is increasing the population of the parasite and decreasing that of the host and this gives the parasite a definite initial advantage in the spring.

Reference.

[1]LUNDIE, A. E.
1924. A biological study of *Aphelinus mali* Hald, a parasite of the woolly apple aphid. Cornell Univ. Agric. Expt. Stn., Mem. 79, 27 pp. Illus.



The Queensland Fruit Fly



The Mediterranean Fruit Fly.

Insect Pests and Their Control.

Notes Contributed by Officers of the Entomological Branch.

Fruit Flies (*Trypetidae*).

IN New South Wales there are two species of fruit flies which attack fruit, viz., the Queensland fruit fly (*Chaetodacus tryoni*), and the Mediterranean fruit fly (*Ceratitis capitata*). They are found chiefly in the coastal districts, where, in some seasons, they may become serious pests of the later varieties of pome and stone fruits. Citrus fruits are only infested to a very limited extent.

Control Measures.

The following control measures are recommended:—

1. *Destruction of Infested Fruit.*—The destruction of all waste and infested fruit should be systematically carried out by every grower, as required by the proclamation, by either boiling or burning or placing in a specially-constructed insect-proof pit. (Details for the construction of suitable pits may be obtained on application to the Department of Agriculture.)

The adoption of this latter method is especially to be recommended in those areas where firewood is difficult to obtain.

2. *Foliage Poison Spray.*—The spray is made up of 1 gallon of fruit syrup, 4 lb. molasses or treacle, 4 oz. arsenate of lead powder, and 3 gallons of water. Apple or pear syrup is recommended for preference, and is made by boiling 5 lb. of inferior fruit in enough water to make 1 gallon of fruit syrup. Strain and discard the fruit pulp. Do not boil too long or the aroma may be driven off. If apples or pears are not available peaches or plums or citrus fruits may be used, although the last-mentioned are less attractive to the Queensland fruit fly.

The spray is applied to two or more patches of the foliage—it is not necessary to spray the whole of it—at the rate of at least 6 fluid oz. per tree. A pump or syringe may be used, but splashing the spray on with a large whitewash brush will

answer. Avoid, as far as possible, splashing or spraying the fruit. Apply the mixture in coarse drops rather than a fine mist, so that the flies can readily feed on it. The first application should be given at least five weeks before the fruit is harvested and the treatment repeated at weekly intervals, five applications being given in all. It is recommended that one application be given in the first place to all trees in the orchard and then each variety should be treated according to its order of ripening. If rain occurs after the spraying a fresh application must be made.

3. *Trapping.*—For this purpose ordinary glass fly traps, preferably fitted with metal or wooden platforms, are used. The traps are baited with about 6 fluid ounces of a lure attractive to the flies, and suspended in the trees by wire tied to the necks of the traps. They should be hung about 6 feet from the ground, if possible on branches that are sheltered by the foliage, and they should be so placed that they are at regular intervals throughout the variety that is being dealt with. Although one trap to every ten trees or less of any one variety is required by the proclamation, a greater number of traps will give better results. Trapping should be carried out systematically, commencing with the earliest varieties and moving the traps in accordance with the sequence in which the varieties of fruit ripen. The following two baits are recommended:—

1. Essence of vanilla ⅛th fluid oz., ammonia ½ fluid oz., water 26 fluid ounces (Jarvis formula)=(1 teaspoonful of vanilla, 1 tablespoonful household ammonia, 3 breakfast cups of water).
2. Apple or pear syrup. This is made by boiling 5 lb. of inferior fruit in 1 gallon of water until pulpy.

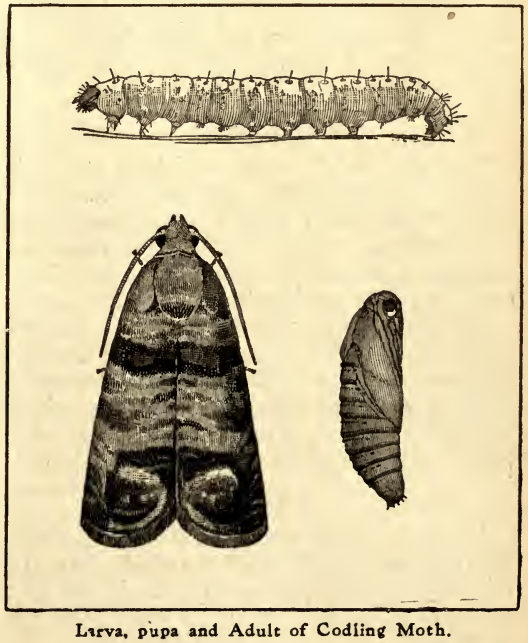
Strain the syrup before use, adding enough water to make up any lost by evaporation. The bait should be renewed every six days, or as soon as it becomes unattractive to the flies. The vanilla-ammonia mixture possesses more attraction than the fruit syrup for the Queensland fruit fly, but is only slightly attractive to the Mediterranean fly, for which the fruit syrup is the better lure.

Codling Moth (*Cydia pomonella*).

At this period of the year preparations for spraying for the control of codling moth should be well in hand. Moths will soon commence to emerge, and the calyx spray must be applied before the sepals of the flowers close, and when the majority of the petals have fallen.

Particular care should be taken that any bandages allowed to remain on the trees over the winter have been examined, and any sheltering larvae or pupae killed. Several examinations of the bandages are advisable as the grubs have a tendency to move about and seek different quarters before pupating in the spring, and may thus find their way from various parts of the tree, or even the ground, to the bandages.

The calyx spray is the most efficient of all for the codling moth, and, if thoroughly applied, will practically eliminate all infestation through the calyx end of the apple. The practice of applying two calyx sprays is not considered advisable under normal conditions.



Larva, pupa and Adult of Codling Moth.

It is usual to apply a combination spray at this time, aiming at the control of codling moth, apple leaf-hopper or jassid, and various fungous diseases. For this purpose lead arsenate 24 oz. per 50 gallons spray, lime-sulphur 1 in 40 (27 B.) and nicotine sulphate 1 in 800 are employed. The lime-sulphur should first be placed in the spray tank and the bulk of the water run in. The lead arsenate powder is then mixed with casein-lime spreader, or with double the quantity of hydrated lime, and made into a fine paste and, finally, several gallons of water are added. This is then added to the spray tank, preferably with the agitator running. A mixture such as this should be used immediately and not held in the tank over dinner hour, or for other such periods.

The nicotine sulphate does not cause any reactions likely to cause injury and the lime-sulphur in this instance serves as an activator. Soap is unnecessary and likely to prove injurious if used in this combined spray. A combination spray such as this will very materially reduce the infestation of codling moth, woolly aphids, red mites and apple-leaf hoppers.

It is important to follow up this spray after a period of three weeks with a cover spray to protect the rapidly-growing fruit. The same spray may be applied with the additional advantage that both the lime-sulphur and nicotine sulphate will act partly as ovicides, and thus kill a considerable number of the eggs of the codling moth.

Under average conditions the nicotine sulphate may be omitted from the calyx spray and used with more advantage in the first cover spray.

The Apple Leaf-hopper (*Typhlocyba australis*).

IN most apple-growing districts of the State it will soon be necessary to carry out measures for the control of the apple leaf-hopper. This common pest of apples sucks the sap from the foliage, thus causing it to become mottled-grey in colour. The leaves may later turn yellow and fall prematurely. In addition, the insects settle on the fruit, and there deposit an unsightly brown excrement which reduces its value and may even render it unmarketable.

Life History.

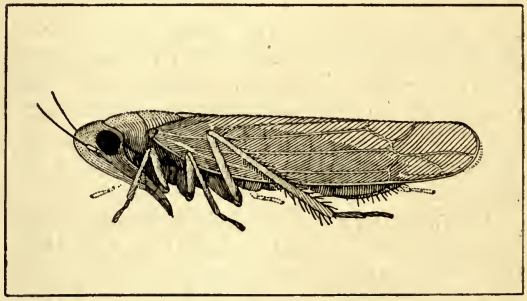
The adult leaf-hopper which is approximately one-sixth of an inch in length, is greenish-yellow in colour, with conspicuous reddish-brown eyes. Its hind legs are adapted for jumping and the insect both hops and flies readily when disturbed.

In the spring the young leaf-hoppers hatch from eggs laid in the bark during the previous autumn. The leaf-hoppers make their way to the under sides of the young leaves and there, after a series of moults, they reach the adult stage.

Control.

Owing to the protected position in which the eggs are laid, and the fact that the adults fly readily when disturbed, the best control can be effected only by applying the spray when the majority of the hoppers are in the wingless nymphal or immature stages.

A spray consisting of 1 pint nicotine sulphate plus 1½ lb. of hard soap in 75 gallons of water gives the most satisfactory



Adult Apple Leaf-hopper.

control of this pest. Two applications are recommended, the first to be made just before any hoppers reach the winged stage, and the second from three to four weeks later, in order to destroy the hoppers which have hatched after the first spray application.

These two sprayings can be conveniently and more economically combined with the calyx spray and the first cover spray of lead arsenate for codling moth control, but

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if this is done the soap should be omitted from the spray mixture.

In practice, lime-sulphur, for the control of black spot, is usually combined with the calyx spray of arsenate of lead for the control of codling moth, and this lime-sulphur spray kills sufficient of the leaf-hoppers to render the first application of nicotine sulphate unnecessary. However, to complete the control of the apple leaf-hopper it will always be necessary to apply a nicotine sulphate spray with the first cover spray used for codling moth control.

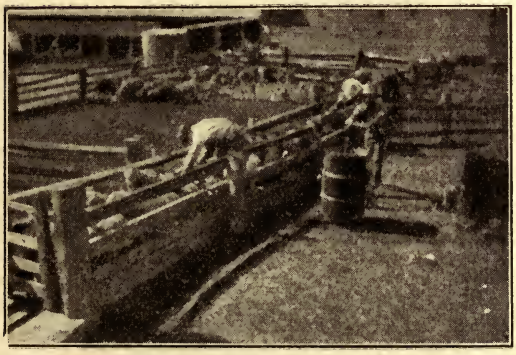
It is important to spray all parts of the fruit and foliage thoroughly, paying particular attention to the under sides of the leaves where the leaf-hoppers are sheltering.

Sheep Blowflies.

The results of Departmental experiments with jetting mixtures, for the control of "strike," carried out by Mr. R. N. McCulloch, Assistant Entomologist, during the past three years, may be said to show—

(1) That calcium arsenite is the most effective, as well as one of the cheapest mixtures available; and

(2) that thorough jetting with calcium arsenite will make handling for crutch strike unnecessary for at least four weeks, and very probably for five weeks.



Using a Hand-operated Jetting Machine in a Branding Race.
With this outfit 800 sheep were jetted in a day.

In this issue of the *Agricultural Gazette* there appears a description and discussion of an experiment at Trangie Experiment Farm, in which a flock of merino ewes was taken from shearing in July to crutching at the end of February by two jettings, and no other treatment for strike.

Fly activity was noticeable from mid-October to December, so that the two jettings did not, of course, provide protection for the whole seven months. But that is not abnormal—the protection of sheep from "strike," in most districts of the State, means their protection during the fly season or seasons.

Practical Application.

A practice that may be recommended as a result of these tests is as follows:—"Jet in the spring when strike appears in the flock, and jet again four, or possibly five, weeks later unless fly activity is confidently thought to be over." In many districts one is able to foretell in late November, from a consideration of weather conditions, whether strike is likely to continue.

The cost for labour (at 10s. per day per man) and materials, for jetting with calcium arsenite with average efficiency, is one-half penny per sheep per jetting. While it gives practical results like those at Trangie, the advantages of this method over repeated hand dressing must be obvious.

To Make Calcium Arsenite Mixture.

The calcium arsenite mixture recommended may be made as follows:—Boil 4 lb. of white arsenic and 8 oz. of caustic soda in 2 gallons of water in a petrol tin, until the arsenic is apparently dissolved. In slightly less than 2 gallons of hot water in another petrol tin shake 4 lb. of stone lime, putting in 1 lb. of lime, or less, at a time, and stirring the water as slaking takes place. Pour the hot milk of lime slowly into the arsenic solution, which should be kept boiling quietly beside the fire. If the lime be added too rapidly, the mixture will boil over. Keep boiling quietly for a further twenty minutes. The petrol tin now contains white calcium arsenite in a weak caustic soda solution. The tinful is made up to 40 gallons for use in jetting.

White arsenic and caustic soda are comparatively easy to obtain and handle (caustic soda being always stored in airtight

tins); stone lime is somewhat more difficult to manage. It is purchased by lime merchants from the burners in sacks, and without additional protection from the air it will deteriorate (air-slake) fairly rapidly. Only hard lumps should be used in the preparation of the spray mixture. Arrangements can generally be made to purchase lumps only, in moderate quantities, and the lumps may be stored indefinitely in 4-gallon press-top tins (these hold about 35 lb. of stone lime) or in "Mintie" tins, etc. For larger quantities a sack or more may be purchased, and the lime stored in drums made air-tight for the purpose.

Equipment.

It must be remembered that calcium arsenite is in the form of minute particles suspended in the jetting fluid. These particles settle out of suspension unless the jetter tank is fitted with a suitable agitator. There are many power-driven jetting machines on the market. All appear very satisfactory, some being more adapted for larger flocks, others for smaller numbers. Many growers are able to fit up a tank, pump, hoses, etc., for use with an engine normally employed in other work.

The pressure should vary from about 100 lb. per square inch on sheep with six weeks' wool to about 130 lb. for three to four months' wool. Higher pressures have sometimes been used, but they are dangerous.

The comparative cost and value of repeated crutching and repeated jetting are discussed in the article in this issue, referred to above. The purpose of this note is to describe the preparation of calcium arsenite jetting mixture and to point out its practical usefulness. It is suggested that jetting be used as the chief defence against the fly between shearing and the one general crutching half-way through the year, which is nowadays so generally practised in New Sonth Wales.

There are graziers who claim that they have achieved longer protection than five weeks after jetting with strong arsenical dips. It is necessary here to repeat that in the many experiments in which calcium arsenite has been compared with dip the former has been definitely superior.

The time allowed to elapse before re-jetting depends (assuming flies to be active) on the number of "moderate" or "bad" strikes one is prepared to allow to develop. Some graziers consider re-jetting unnecessary, while no strikes spread beyond the jetted area. In the experiments referred to above, while admittedly the standard is somewhat vague, re-jetting was aimed at when approximately 2 per cent. of the sheep had strikes as large as 2½ inches across.

Modifications of the Mixture.

Modifications of calcium arsenite mixture, which were tested during the season, consisted of the addition to the dilute jetting fluid on one occasion of Bordeaux mixture, and on two other occasions of sodium silico fluoride.

The reason for their inclusion was the opinion that arsenic may be lost from the soiled and wet crutch wool susceptible to strike, through the action of a mould *Penicillium brevicaule*. This fungus is known to release an arsenical gas when it develops on moist organc material in contact with many forms of arsenic. Copper and fluorine are strongly toxic to *Penicillium*. In these tests neither fungicide apparently increased the efficiency of the jetting material.

Destruction of Common Barberry now Compulsory.

ATTENTION is directed to the fact that by a recent proclamation under the Plant Diseases Act the destruction of the common barberry (*Berberis vulgaris*) has been made compulsory. The reason for this prohibition is the menace which the plant constitutes as a "carrier" of stem rust of wheat and as a possible breeding ground of new strains of the disease.

Of a shrub-like growth, spiny, bearing clusters of small yellow flowers and subsequently groups of small red berries, the plant occurs occasionally in our cooler districts. An illustration of it is contained in Plant Disease Leaflet No. 31 (Rust Diseases of Cereals) obtainable free from the Department.

The application of salt or kerosene to the crown of the plant is effective in its destruction. Digging out is recommended only for small plants which permit of eradication of the complete root system.



October in the Orchard.

C. G. Savage and W. le Gay Brereton.

Seasonable Reminders.

Cultivation.

In most districts the winter and early spring have been abnormally dry, and consequently it is important, not only that loss of moisture should be prevented as far as possible, but that the land should be kept in such a condition that it will readily arrest and absorb any rains that fall. If the land has become fined down or compacted by trampling during spraying operations, a ploughing would leave it in the desired condition. Any weeds about the butts of the trees should be dealt with; if they cannot be reached by the horse or tractor implements hand tools should be used.

During cultivation retaining drains are frequently choked. These, of course, should be cleaned out at the end of each day's work at least sufficiently to keep them effective; but a later opportunity should be taken to clear them more thoroughly. Surface drains should be examined from time to time and cleared of any silt or debris collected.

Refills.

Special attention should be given to refills planted since the original planting. The roots of these younger trees are not fully established and suffer badly during a dry spell if not watered. Many die if neglected, and those that survive receive such a check that they cannot be expected to develop into useful trees.

When watering refills care should be taken that the water soaks in around the root area. It is best to open a furrow around the tree, pour in two or three buckets of water, and, after it has soaked in, fill in the furrow with loose dry soil or, if available, some rotted farmyard manure, leaves or straw. Watering is liable to produce a crop of weeds which should be promptly dealt with, otherwise they will quickly rob the tree of moisture.

After-care of Buds and Grafts.

It is not uncommon to see established trees that have been budded or grafted partially, if not entirely, ruined through neglect after a quite satisfactory "take" has been obtained. Care should be taken to cut or remove the wrapping which has been used to tie the buds or grafts in position before it cuts into the wood.

It is generally found convenient to cut back the shoots that carry the inserted buds a couple of inches above the inserted buds;

the natural buds above the latter will then start into growth, and if not checked are likely to give a severe setback to the growth from the inserted buds. Although it is better to check the growth coming from above the inserted buds only, this generally entails too constant attention; the surest way, therefore, is to rub them right out soon after they commence growth.

Many growths will also start below the inserted buds or grafts, and care must be taken to prevent these growths from sapping the inserted buds or grafts. Shoots from below which show great vigour are better rubbed right out so that they will cause no more trouble, but the lighter shoots should be retained and checked only to prevent them from sapping the inserted buds or grafts. Not only do they shade the limbs of the tree, keep the sap moving, and thus keep the bark of the old limbs in better condition, but they provide foliage to assist in the assimilation of the raw sap. The practice of stripping away all growth from below the inserted buds or grafts certainly saves later work, but it is not the best for the health of the tree. Moreover, the growths from below afford protection to the inserted buds or grafts from winds; when they are stripped away greater losses of shoots from the inserted buds or grafts occur.

After the growth from the inserted buds has reached a couple of inches in length it should be supported by a tie. Where a stub two or three inches long has been left above the inserted bud when cutting back, this stub provides a convenient support. The tie should be made tightly around the stub and loosely around the shoot from the inserted bud.

Shoots growing from grafts also require support. This can be provided by sticks strapped to the limbs, the shoots from the grafts being then loosely tied to the sticks.

The after-care of buds and grafts is dealt with fully in a leaflet issue free by the Department.

Thinning of Fruit.

Some of the very early setting peaches grown in the coastal districts will have already been thinned, but in the case of other stone fruits thinning should not be done until the natural second shedding has taken place, when one can form an idea as to whether the crop will be too heavy or not. If it is decided that thinning is necessary, all blemished or malformed fruit should first be removed, then, if the fruit still appears too thick on the part of the tree receiving attention, the remainder could be spaced by thinning, but here again preference should be given to the larger fruit, taking off the smaller.

Even if the crop is light and thinning is not required, the removal of blemished or badly malformed fruit is an advantage, as it gets rid of worthless fruit at an early date and saves time when picking and packing.

Spraying.

The dry winter and early spring have not been favourable to the development of fungous diseases. However, growers should not be off their guard; should moist weather occur during the early part of the summer, outbreaks of black spot of apple, pear, and grape vine are likely to occur in districts liable to these diseases.

By the time these notes appear the periods will have passed for the initial pre-blossom sprays for the control of black spot of apple and pear and for the swabbing of grape vines, but during October most varieties of apple trees will be ready for the calyx application of lime-sulphur. It is now recommended that the calyx application of lime-sulphur on pears be omitted. Pears receive two pre-blossom applications of 6-4-40 Bordeaux mixture, one at the green-tip stage and the second at the spur-burst stage.

Powdery mildew of apples often appears to be as severe in dry springs as in wet ones. In most districts the spray programme recommended for the control of black spot also controls powdery mildew of apple, but where mildew persists in spite of the black spot spray application, a spray of one of the finely-divided sulphurs, such as atomic sulphur, should be used.

Leaflets are obtainable free from the Department on the control of black spot and powdery mildew of apple, also black spot, oidium, and downy mildew of grape vine.

Packing of Berry Fruit.

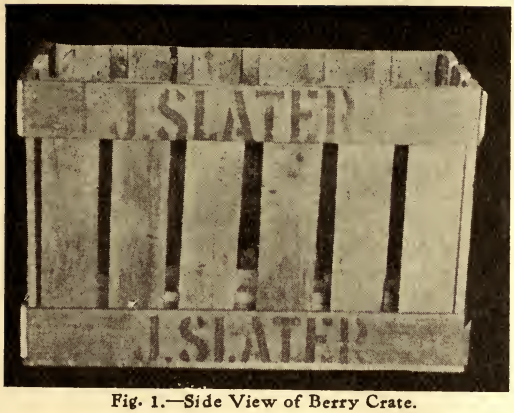


Fig. 1.—Side View of Berry Crate.

Inquiries have been received by the Department of late in reference to the packing of berry fruits. Strawberries are, of course, the chief berry fruits marketed in Sydney, but raspberries, loganberries and gooseberries also arrive packed in punnets.

Through the courtesy of Mr. J. Slater, of the Sydney Municipal Fruit Markets, we were able to secure the dimensions and photographs of the crates used for packing berry fruits consigned to this market.

Punnets for Packing Berry Fruit.

The wood chip punnet chiefly used by the growers of this State is 4¼ x 4¼ inches at the top and 3¼ x 3¼ inches at the bottom, and is 2 inches deep. The punnets are generally packed in crates of two sizes, one holding fifty punnets and a smaller one thirty punnets. The fifty-punnet crate is made as follows:—

Internal dimensions: Length 22½ inches, width 8⅞ inches, and depth 15 inches. The sides are made of six 3 x ⅜ inch wood slats, 15 inches long, nailed top and bottom to 3 x ⅜ inch cleats. The six slats are perpendicular, and the cleats to which they are nailed form the top and bottom edges of the sides of the crate. The top and bottom cleats are 23½ inches long. The outside edges of the two end slats are nailed ½ inch from each end of the cleats. The other four slats are spaced equidistant apart along the top and bottom cleats. (See Fig. 1.)

The ends are made of three slats 2½ x ½ inch x 15 inches long, nailed to top and bottom cleats 10⅜ inches long of 3 x ⅜

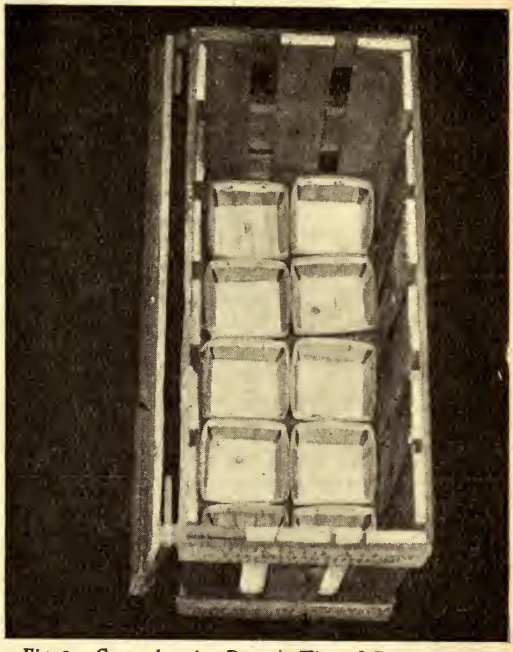


Fig. 2.—Crate showing Bottom Tier of Punnets, end Construction and Hinged Lid.

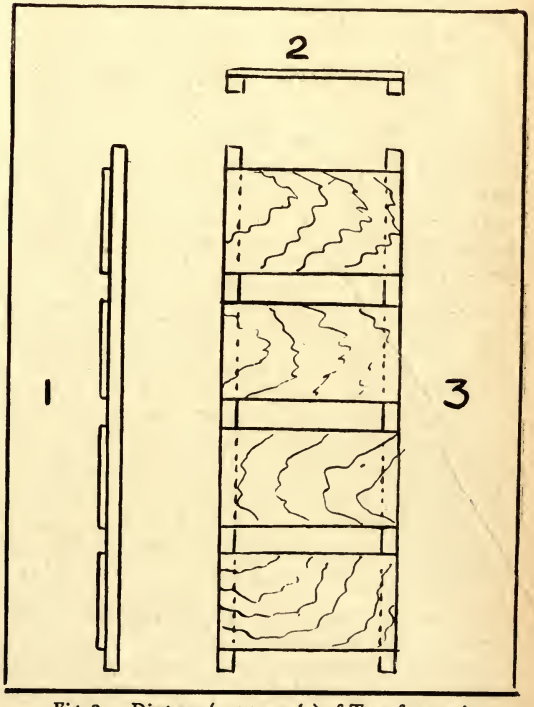


Fig. 3.— Diagram (not to scale) of Tray for use in Strawberry Crate.
1. Longitudinal section. 2. Cross section. 3. Top view.

inch timber. The slats stand perpendicularly. The outside edges of the two end slats are nailed ⅜ inch in from the ends of the top and bottom cleats. The third slat, 15 x 2½ x ½ inch, is nailed midway between the two outer slats. (See Fig. 2.)

All the cleats are placed outside, and the perpendicular slats form the inside surface of the crate. The bottom of the crate is made solid of ⅜ inch timber, generally of two boards 5 inches wide. The lid is made of ⅜ inch timber, generally of two boards 5 inches wide, cleated together with 2½ x ⅜ inch timber at each end and hinged to the crate with leather in a manner similar to the hinged-lid fruit case.

This crate holds ten punnets to the tier (see Fig. 2), and will take five tiers. Over each tier of punnets a tray is placed. The trays are made of four pieces of wood 4 x 1/10 or ⅛ inch and 8¾ inches long, nailed to two cleats ½ x ½ inch and 22 inches long. The two end pieces (each 4 x 1/10 inch) are nailed about one inch from the ends of the ½ x ½ inch cleats, and the other two pieces (each 4 x 1/10 inch) are spaced equidistant apart along the length of the ½ x ½ inch cleats. (See Fig. 3.) It is important that the width of these trays should fit closely inside the crate, so that, when the tray is placed cleats downward over the tier of packed punnets, the cleats rest on the outside edges of the punnets and the 4 x 1/10 inch pieces do not touch the fruit.

Any space between the tray over the top tier of punnets and the lid of the crate should be padded with paper or other packing, so that when the lid is fastened down the tiers of packed fruit cannot move.

The 15 inch depth of the crate described could be reduced with advantage if only 2 inch deep punnets were packed, but some growers use a somewhat deeper punnet, for which the full 15 inches depth in the crate is required.

The lid of the crate should be marked in plain block letters:

BERRY FRUIT.
THIS WAY UP. WITH CARE.

The thirty-punnet crate holds three tiers of ten punnets, and is constructed and packed in exactly the same manner as the fifty-punnet crate, except that the depth is 8¾ inches only.

Jetting and Crutching for the Control of Blowfly Strike.

[Continued from page 570.]

struck at the time of the first treatment, and that a month later 15 per cent. of the jetted sheep were "touched," shows (along with the experience in other flocks on the farm) that "strike" was, for that period at least, potentially severe.

More evidence is needed before one can state with certainty the period during which, under conditions favourable to the fly, crutching or jetting will make hand-dressing for crutch strikes unnecessary in the average western flock. The data obtained in the 1933-34 season indicated that jetting with calcium arsenite would give at least four weeks' and probably five weeks' practical protection as compared with six weeks following crutching.

One crutching, done under contract conditions, is slightly more costly than two jettings with calcium arsenite done with average speed and efficiency by station employees; and repeated crutching suffers further by comparison, to some moderate extent, through its shortening the staple of the wool removed. On the other hand, jetting allows a number of sheep to become struck, though it reduces very greatly the rate of spread of individual strikes. No statistical evidence is at present available to show whether 15 per cent. of very slight to moderate strikes, such as were found on 15th November in the jetted sheep at Trangie, may affect adversely the wool production of the flock. As far as could be judged from appearances, the influence on the health of the sheep was unimportant.

In the writers' opinion both methods of wholesale treatment are markedly superior to repeated hand-dressing during the normal spring period of fly activity at Trangie. Crutching at the end of summer, and jetting six weeks later, were shown in 1934 to give "practical protection" between them for eleven weeks. The possibilities of this wholesale treatment when applied to ewes lambing soon after the general crutching will be the subject of further experiment.

Seasonable Work in the Apiary.

Notes by W. A. Goodacre, Senior Apiary Instructor.



A Colony Well Built-up in the Spring.
A good frame of bees and brood from a populous hive.

A Busy Time for the Beekeeper.

October and early November is a busy time for the beekeeper, and a good deal depends upon his work. The flora shows only a scattered prospect, and with a poorer season in view the colonies should be kept in the best condition to make the most of any honey flows. Even though they are working a light flow, colonies which are kept in good heart and populous may store a useful surplus, where weaker ones would little more than keep themselves going.

With evidence of the progress in brood rearing usually found at this period, queen rearing and artificial increase of the colonies—both very important branches of bee-farming—may be carried out. The more progressive colonies may be considering natural increase by swarming, and measures to minimise this tendency should be employed.

It is now a good time, with the season just commencing, for the intending beekeeper to make a start. It has been mentioned that the prospects for the season generally are not very promising for honey production, and the question might be raised as to the usefulness of going in for building up the apiary or making a commencement in beekeeping just now. Unless a severe drought occurs, however, there should be sufficient flowering flora to allow of young colonies being built up for the better seasons to come.

Hints on Queen Rearing.

Under warm and stimulating late spring conditions, the rearing of queen bees is not a difficult proposition, and it is surprising that a greater number of beekeepers do not practise this important branch of apiary work. Certainly it is necessary to have suitable stock to breed from, but where a number of queens (even untested ones) have been purchased from a special queen rearing apiary it should be possible to select a suitable breeder or two from amongst them following a local test

of their qualifications. A queenless colony which has worker eggs or very young larvae available in the brood combs will surely raise queen cells to provide a queen. The fertile eggs or young larvae from them can be made to produce either workers or queen bees, according to the desire of the colony. To secure a worker (an undeveloped female) the larva is weaned on about the third day; for a queen (a fully developed female) the feeding occupies the whole of the larval stage. The whole system of queen rearing is based on these interesting facts.

A Simple Method.

It is not proposed here to deal with scientific queen rearing for the advanced beekeeper or commercial queen breeder; this is dealt with in the Department's bulletin on bee culture. The following directions, however, will be helpful to the less experienced:—

Place a frame containing a strip of comb-foundation in the centre of the brood nest of the selected colony it is desired to breed from. When the bees have built comb down somewhat in the frame and the queen has laid eggs in the cells, select a good line of cells with eggs or very young larvae and cut off any comb from directly below. If the frame is then placed with a populous single-story colony that has just been made queenless and which has had its unsealed brood removed, good queen cells should be built up by the bees along the line of selected eggs and larvae, and in a position convenient for the bees and for the removal of the cells by the beekeeper when completed.

It is advisable, when the cells are started, to destroy any not in a good position for removal, and those above requirements, so that the bees will concentrate on feeding and attending to the remainder. Eleven days after the queen cells are started they will be ripe enough for placing in nuclear hives for increase of stocks or for use where queens are desired in the main working hives.

Artificial Increase.

Artificial increase is a matter of dividing the working force, brood and stores of a colony. It is possible to make quite a number of new colonies from one well-populated hive, but unless the apiarist is experienced it is advisable to go in for moderate increase only. There is no great risk in attempting this work along moderate lines, and the production from the parent colony then is not interfered with to any extent.

The Principle of Artificial Increase.

Suppose we prepare a new single-story hive and place in it two combs, one well filled with honey and the other empty; then from the populous hive secure a good frame of brood, well covered with bees (making sure the queen is not present), and place it between the combs in the new hive. If a ripe queen cell is placed on the brood comb, or a queen bee is introduced, we thus have the nucleus of a new colony. To get the bees used to their new home, press a strip of wire cloth into the hive entrance and keep them inside for a couple of days, keeping the hive shaded.

Swarming.

Swarming is the bees' natural method of increase, but it makes rather drastic division of the colony and there is risk of losing the swarm. For these reasons beekeepers prefer to control it as much as possible.

It can be readily understood that in a colony of bees which is being built up in population, and where there is little room in the hive for expansion, some relief of the position by swarming will be desired. During the extensive brood rearing usual at this period of the year, the apiarist should therefore provide sufficient accommodation so that the colony will not become cramped. Other precautions of assistance in minimising swarming tendency are sufficient entrance ventilation in the hives, working of reasonably young queen bees, and use of good brood combs.

Nucleus Colonies for Beginners.

It is often preferred by the beginner to purchase a nucleus colony of bees for a commencement, and it is a very good way to make a start. The nucleus contains three full-depth, standard-sized frames with sufficient bees, brood and stores, to allow of independent building up. On account of fast transport and better care, it is the usual



Bees are not Savage when Swarming.

practice to forward live bees per mail train.

When a nucleus colony is received, the hive should be placed on a stand in a selected situation. The cover should then be removed and replaced in its right position. The wire screen over the frames need not be immediately interfered with. The bees should next be liberated by opening up the hive entrance, giving a puff or two of smoke to prevent a rush. Then place a folded bag over the hive cover, a weight on top, and leave the colony to settle down.

Once the bees have settled down, a matter of a few hours generally, the combs, bees and all, may be transferred to a full-sized hive, which should be prepared in readiness to receive them. During transferring manipulations, the bees are generally easy to control and very little smoke should be used. Just a puff or two through the wire cloth screen whilst removing it is generally sufficient.



A Nucleus Hive.

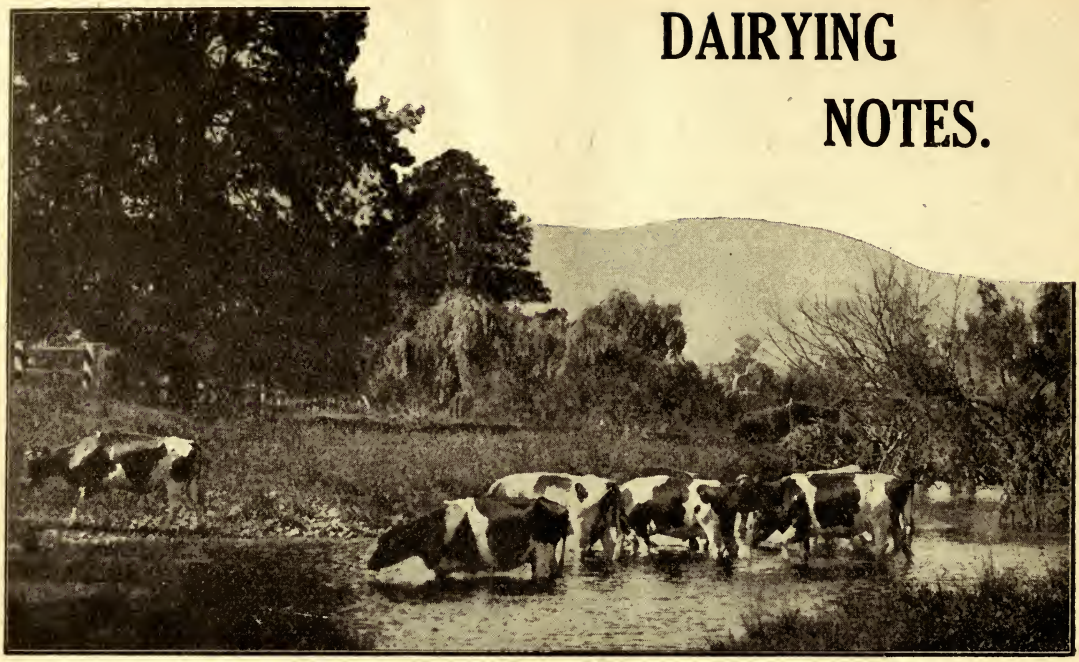
Abortion-free Herds.

The following herds have been declared free of contagious abortion (Bang's disease) in accordance with the requirements of the scheme of certifying herds abortion free :—

Owner and Address.	Number in herd.
Bawtree, B. F. W., Ben Lomond	17
Bush, W., Ben Lomond	32
Caldclough, A. E., "Dunelm," Ben Lomond ...	46
Cann, H. J., The Gap, Alstonville	...
Dixson, R. C. "Elwatan," Castle Hill	25
Douglas, L. M., Ben Lomond	19
East, N. A. L., East Valley, Gum Flat, via inverell...	51
Forster, N. L., Abington, Armidale (Aberdeen-Angus)	170
Forster and Sons, Abington, Armidale (Jerseys) ...	62
Hawk, J. T., Ben Lomond	11
Henderson, C. Beaufort, Glen Innes	17
Henderson and Son, Upper Wantagong, Holbrook ...	111
King, H. S., Glenroy, Llangothlin	43
McSweeney, W. J., "The Rivers," Canowindra (Jerseys)	95
McSweeney, W. J., "The Rivers," Canowindra (Shorthorns)	45
Martin Bros., "Narooma," Urana-road, Wagga Wagga	146
Murray, A. W., Oakwood, via Inverell	26
Navua Ltd., Grose Wold, via Richmond (Jerseys) ...	57
Rydalmere Mental Hospital, Rydalmere	63
Sams, C. R., Wilson's Creek, Mullumbimby	32
Sigley, A., Wilson's Creek	35
Skinner, D. S. "Wyworrie," Ben Lomond	20
Smith, Jas. C., Ben Lomond	43
Walker, Jas. R., "Strathdoon," Wolseley Park ...	33
White, F. J. and Sons, Bald Blair, Guyra	261
Williams, Chas., Ben Lomond	41
Wilson, R. A., Meryla, Culcairn	43

—Max Henry, Chief Veterinary Surgeon.

DAIRYING NOTES.



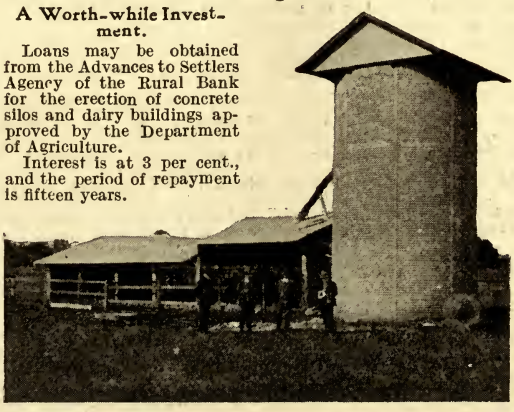
Butter Quality is More Important than "Characteristic Flavour."

TAKING last year's quality figures of our export butter, which could be accepted as a true reflex of the position for several years past, pointed out Mr. G. Stening in a paper read before the recent State Conference of the Agricultural Bureau, New South Wales exports totalled over 80 per cent. choicest quality, whereas the figure for the whole export from Australia was under 50 per cent. As our butter was known in England as "Australian," and not that of any particular State, our position in the market was obvious. If the whole of Australia's butter export totalled 80 per cent. of choicest quality, it would not only assuredly improve our price position, but also reduce the margin in price now existing between it and that of the other leading countries.

A Worth-while Investment.

Loans may be obtained from the Advances to Settlers Agency of the Rural Bank for the erection of concrete silos and dairy buildings approved by the Department of Agriculture.

Interest is at 3 per cent., and the period of repayment is fifteen years.



All the talk about the effect of difference in characteristic flavours and physical attributes of the butter of various countries as compared with our own, when reference was made to quality comparison, was so much "beating the air," for he had found, especially about London, where by far the greatest amount of our produce was sold, that provided the quality was quite sound and sweet, with true butter character, and colour (which was important — not too deep), it met all requirements, and fulfilled the specifications of the retailers and consumers. This, consistently and uniformly supplied, would soon restore

us to a higher price position, and increase counter demand.

Quality standardisation therefore should have the first call on all our State Agriculture Departments, and steps should immediately be taken to consolidate action on effective lines.

Even with quality improved, efforts toward marketing improvement would be considerably minimised unless supplies were so controlled that there would be a uniform spread in shipments throughout the year, the weekly quantities being larger in our months of high production and lowest in our winter months, when Northern Hemisphere production was at its highest.

Why We Should Eat More Cheese.

"That far too little cheese is eaten in Australia" is the opinion of Mr. H. J. Bate, M.L.A. Our people, he claims, eat more butter per head than any people in the world—about 30 lb. per head per annum—but less cheese—only 3½ lb. per head per annum. In Great Britain and other European countries the per capita consumption is three times as much. If our people can only be induced to eat another 2 lb. per year it will make "all the difference" to the cheese industry.

Cheese is a valuable basic protein food which can easily take the place of meat, and in many instances can be made quite as palatable. If one remembers that cheese contains approximately 30 per cent. protein, 30 per cent. fat, and 30 per cent. water, it will be realised what a valuable concentrated food it is. To put it another way: Actually 16 oz. of the best kind of cheese represents nearly all the fat and the total amount of protein in a gallon of whole milk. Meat contains about 75 per cent. of water—the rest is fat and protein. Taking the same weight of cheese and meat, it will be found that the cheese contains about double the amount of protein and fat that the meat does.

Use Kikuyu Grass to Control Bracken in Coastal Pastures.

Kikuyu grass is a perennial, and spreads rapidly over the ground by means of running stems or stolons, which carry a large quantity of leafy material, thus providing a very bulky mass of fodder. The grass grows very rapidly, and the stolons send out roots from every node or joint, thus anchoring the plant firmly in the ground, and at the same time forming a dense turf, which will stand the tramping of heavy stock well. This turf-forming habit is one of the most important factors to be considered when selecting grasses for permanent pastures subject to heavy stocking. Tussocky grasses do not cover the ground well, since some plants die out, leaving bare patches which later on become smothered with weeds.

Because of these habits of growth kikuyu grass is useful in coastal bracken fern country, where the grass tends to choke out the fern. Fern country on which it is intended to grow kikuyu should be ploughed and worked prior to planting in the spring, or if the soil be of an open, free nature the fern fronds should be cut in the early spring, burnt, and the grass roots hoed in. On large areas drills 3 feet apart should be struck out with a single-furrow plough, kikuyu cuttings or rooted runners being dropped every 3 feet in the bottom of the drill, and covered with a light furrow, or by running a harrow along the drills in the direction in which they run. If the weather is at all favourable, the kikuyu grass makes

headway as soon as, or before, the fern, and by winter there is only sufficient fern showing to protect the grass from frost. By the following spring a mat of grass has formed over the blank spaces, and the fern is gradually choked out, while the cattle feeding on the grass tramp down the bracken, and in this way help to eradicate it. The grass should be permitted to become well established before being fed off, as the cattle may tear up the runners if not well rooted.

It Provides Excellent Feed.

Kikuyu provides excellent quality feed, and though mainly a summer grower, withstands dry conditions better, remains greener for a longer period, and provides a greater bulk of feed during the winter months than does paspalum.

To ensure a better balance of feed, seed of White clover (*Trifolium repens*), sown at the rate of 4lb. per acre, should be broadcasted over the planted area during the autumn of the early period of the establishment of the kikuyu and lightly harrowed in. Top-dress with 1½ to 2 cwt. of superphosphate per acre in the autumn of each year.

As kikuyu seldom forms seed, it should not be difficult to keep it in check if so desired. Planting on land that is to be used for cultivation at some future date is not recommended, as once the grass is well established it is somewhat difficult to eradicate.



Kikuyu Grass.
This grass possesses a strong main root system, and throws out ro ots at every node or joint of the stem.

Fertiliser must be Sold under a Registered Brand or Name.

The Fertilisers Act, 1934, provides that no fertiliser shall be sold except under a registered brand or name. Any dealer who desires to have a brand or name registered shall make application on the prescribed form on or before the first day of November next. Application forms may be obtained from the Department of Agriculture, Farrer-place, Sydney.

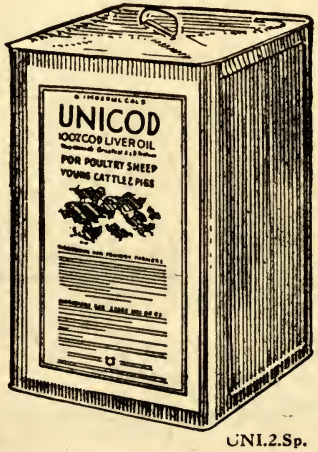
Any person who sells any fertiliser except under a brand or name registered under this Act, applies, advertises or makes use of any unregistered brand or name in connection with any fertiliser, or sells any fertiliser not contained in a parcel on which is conspicuously marked the registered brand and name, will be liable to a penalty not exceeding £100.

It is also desired to point out that, under the Act, the Minister may refuse to register a brand or name if in his opinion it is likely to mislead a purchaser as to the constituents of the fertiliser, and in this regard the Minister will not register the title "Blood and Bone" unless the fertiliser comprises, apart from any "filler" which may be added, a mixture of only desiccated blood and disintegrated bone.



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or

THE MANAGER,
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Bomen

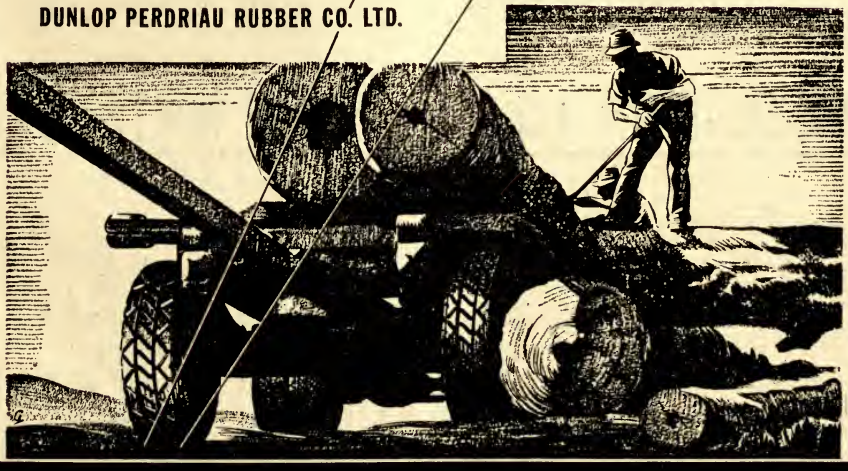
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(*Farmers' Bulletin No.* 169.)

by

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Shortage of Bran and Pollard.

The dry conditions that have been experienced in most parts of the State during past months have resulted in an increased demand for bran and pollard, and this, combined with little activity in the export of flour, has caused a shortage of these two main constituents of the mash portion of poultry rations. The result has been a sharp increase in prices, and there is also an upward trend in the price of wheat. This increase in the cost of feeding coming at a time when egg prices are falling is causing many poultry-farmers grave concern.

Substitutes.

The shortage of pollard and bran naturally raises the question as to what can be used as substitutes and, while a number of commodities might take their place, the difficulty is to obtain them in sufficient quantities or at prices which would render them economical to use.

Wheatmeal, although no cheaper, is practically the only readily available substitute for pollard; lucerne meal and finely-cut lucerne chaff, combined with chaffed green feed and, perhaps, cocoanut meal, are the main items which could take the place of bran.

Experiments in progress at the Hawkesbury Agricultural College in connection with the feeding of wheatmeal, although not conclusive, indicate that finely-ground wheatmeal can safely be incorporated in the mash, to the extent of at least 50 per cent., without loss of production, but, owing to the carbohydrate content being higher than in pollard, it is necessary to use a somewhat larger proportion of meat meal to bring about the correct protein ratio.

Following are suggestions for alternative mashes using the various substitutes mentioned:—

(1)	lb.
Fine wheatmeal	50
Pollard ...	12½
Bran	15
Prime lucerne meal or chaff	15
Meat meal ...	7½
	100

(2)	lb.
Fine wheatmeal..	50
Rice pollard ...	12
Bran	20
Cocoanut meal ..	10
Meat meal ...	8
	100

(3)	lb.
Fine wheatmeal.	53
Pollard ...	15
Prime lucerne meal or chaff	14½
Cocoanut meal	10
Meat meal ...	7½
	100

(4)	lb.
Fine wheatmeal..	50
Pollard	17½
Bran	15
Cocoanut meal ..	10
Meat meal ...	7½
	100

Emergency Ration.

	lb.
Fine wheatmeal	66
Prime lucerne meal or chaff..	15
Cocoanut meal	12
Meat meal	7
	100

Salt at the rate of 22 oz. per 100 lb. of ingredients should be dissolved in the mixing liquid for a wet mash, and 12 oz. per 100 lb. added to a dry mash.

Dirty Eggs.

FOLLOWING upon the prohibition against cleaning eggs for export, the Egg Board has decided upon a different policy with regard to dirty eggs. A direct charge is made to the producers concerned for cleaning moderately dirty eggs as previously, but very dirty eggs are now being sold as case eggs. This will have the effect of reducing the average price of eggs from farms where care is not exercised in preventing them from becoming soiled.

A Double Semi-intensive House Showing Suitable Nesting Arrangements.



The poultry-farmer can do much to avoid any large number of eggs becoming soiled, particularly in fine weather, and some of the main factors in preventing this trouble are to provide clean scratching litter in the laying houses, and use litter or sand, etc., under the perches to prevent the birds' feet from becoming dirty. Adequate nesting accommodation with clean nesting material is also very essential. In this regard one nest should be provided for each five hens, and the material used in the nests should be either grit, rice-hulls, straw, soft-wood sawdust, etc., but, whatever is used, it is necessary to keep the nests clean. Another cause of dirty nests is the roosting of hens on the nests at night, and, where this takes place, a wire frame may be fitted to the front of the nests or other means adopted to keep the birds out at night time.

During wet weather, if suitable housing conditions are available, it would be advisable to keep the birds shut in during the morning, until most of the eggs have been laid; the eggs should be collected two or three times during the day.

One of the most prolific causes of dirty eggs is large houses accommodating big flocks of birds without any scratching litter on the floors, and another is the long shed system with narrow runs which, in wet weather, become a quagmire.

Apart altogether from the reduction in returns on account of dirty eggs, the matter of the keeping quality is very important during the summer time, and eggs which have become badly soiled, even though they may be washed, are likely to be impregnated with bacteria which will effect their subsequent quality. It therefore behoves every poultry-farmer to give the question careful consideration in order that his eggs may be marketed in the best possible condition. In this way, every producer can materially assist in co-operative marketing.

Rhode Island Reds.

As far back as twenty years ago Rhode Island Reds were popular in this State, but they went out of favour mainly on account of the difficulty in breeding for colour, owing to the fact that colour was not as much a fixed character as it is to-day. The

result was that, through careless breeding, a large proportion of some flocks was non-descript in this respect, many resembling crossbreds.

In recent years this breed has become one of the leading commercial breeds in England, and is bred extensively in America.

At the present time the Rhode Island Reds are increasing in popularity on commercial farms here, and it would be a good thing for the industry if another breed or two could be added to the meagre list of commercial breeds. Of course, one of the chief objections to a coloured breed is the difficulty of breeding reasonably true to colour, and many utility breeders will not go to the trouble of studying the finer points of breeding, with the result that a breed such as Rhode Island Reds soon loses its attractiveness. There is no reason why this breed could not be bred to a satisfactory standard of egg production, and, as far as table qualities are concerned, it will more than hold its own with other commercial breeds on the local market. Moreover, it has the advantage of being hardy, but with any great increase in popularity it would become essential to import birds of the right class to avoid too much in-breeding, which is one of the chief reasons for degeneracy, particularly in high producing breeds. For those who may not be familiar with the standard requirements of this breed, the English Poultry Club standard, under which birds are judged here, is reproduced hereunder:—



Rhode Island Reds.

The Cock.

Head.—Skull strong, but not thick. Beak curved, moderately long. Eyes large and bright. Comb (*a*) single, or (*b*) rose: (*a*) medium size, upright, straight and firmly set, with five even serrations; (*b*) low and firm, oval top covered with small points and terminating in a small spike, following the curve of the head. Face smooth. Earlobes fine texture, well developed and pendent. Wattles of medium size and moderately rounded.

Neck of medium length and profusely covered with hackle flowing over the shoulders, but not too loosely feathered.

Body fairly deep, broad and long, but a distinct oblong rather than square; broad and full breast; long back, horizontal except where the neck-hackle flows over the shoulders and the saddle gently rises; large wings well folded and the flights horizontal; fairly small tail, sickles passing a little beyond the main feathers, well spread, and carried somewhat low (but by no means drooping) to increase the apparent length of the bird.

Legs of medium length; large thighs; well-rounded shanks free of feathers. Toes (four) straight, strong, and well spread.

Carriage alert, active and well balanced.

Weight, 8½ lb.; cockerel, 7½ lb.

THE HEN.

The general characteristics are similar to those of the cock, allowing for the natural sexual differences. Weight 6½ lb.; pullet, 5 lb.

COLOUR.

Beak red-horn or yellow. Eyes red. Comb, face, earlobes and wattles brilliant red. Legs and feet yellow or red-horn.

Plumage of the Cock.—Hackle red, harmonizing with back and breast. Wing: primaries, lower web black, upper red; secondaries, lower web red, upper black; flight coverts black; bows and coverts red. Tail (including sickles) black or green-black; coverts mainly black, but may be russet or red as they approach the saddle. Remainder, general surface rich brilliant red, except where black is specified, free from shafting, mealy appearance, or brassy effect; depth of colour (red) is slightly accentuated on wing bows and back, but the least contrast between these parts and the hackle or breast the better, a harmonious blending desirable. The bird should be of so brilliant a lustre as to have a glossed appearance. The under-colour and quills of the feathers should be red or salmon. With the saddle parted showing the under-colour at the base of the tail, the appearance should be red or salmon, not white or smoke. Black or white in the undercolour of any section is undesirable. Other things being equal, the specimen having the richest undercolour shall receive the award.

Plumage of the Hen.—Hackle red, the tips of the lower feathers having a black ticking, but not a heavy lacing. Tail black or green-black. Wings as in the cock. Remainder, general surface lighter and more even than in the male, free from shafting or mealy appearance, and except where black is specified a rich even shade of bright red, not as brilliant a lustre as the male. The undercolour and quills of the feathers should be red or salmon. Black or white in the undercolour of any section is undesirable. Other things being equal, the specimen having the richest undercolour shall receive the award.

SCALE OF POINTS.

Colour (plumage, etc., 25, eyes 5)	30
Type, including size	30
Quality and texture	15
Head	10
Condition	10
Legs	5
	100

Serious Defects.—Feather or down on shanks or feet, or unmistakable indications of a feather having been plucked from the same; badly lopped combs, side sprig or sprigs on the single comb; entire absence of main tail feathers; two absolutely white (so-called wall or fish) eyes; a feather entirely white that shows in the outer plumage; an earlobe showing more than one-half the surface permanently white (this does not mean the pale earlobe, but the enamelled white); shanks and feet other than yellow or red-horn; any deformity.

REMINDERS FOR OCTOBER.

Those who desire to plant lucerne may do so during this month, but the earlier the better. Provided the ground is clean and well worked and adequate water is available, lucerne can be successfully established at this time of the year.

Check over egg production from the various pens to see if the hens are laying up to expectations. During this month a well managed flock should average about nineteen eggs per bird.

With the approach of warm weather a sharp increase in broodiness among heavy breeds might be expected, and proper facilities should therefore be provided for handling broody hens, otherwise much loss of production will be sustained. Slatted bottomed crates with compartments of about 3 feet x 2 feet will be found both convenient and effective.

Coccidiosis.

A Deadly Disease of Chickens.

T. G. Hungerford, B.V.Sc., H.D.A., Veterinary Officer.

Coccidiosis is a widespread and serious contagious disease of chickens. Chickens two to ten weeks of age are the class of stock most commonly affected, and in birds of this age it is by far the most important and deadly disease.

Old fowls are affected, but under normal circumstances show no symptoms; they merely act as carriers of the infective micro-organism. If some other factor lowers the bird's disease resistance, coccidia may then be the cause of symptoms in the adult. The bird becomes listless, dejected, loses condition and the comb becomes pale. Egg production ceases, diarrhoea is present, and the bird may die. This is one of the factors that terminate the life of an odd fowl here and there, such deaths being classed by the poultry farmers as "just the normal loss."

Cause.

The cause of the disease is a small animal parasite (*coccidium*), too small to be seen by the naked eye. Without the presence of this parasite coccidiosis cannot develop. Chickens are susceptible from the age of a fortnight, and the worst mortalities are usually experienced in chickens three to five weeks old.

The incubation period of the disease is about five days. In view of this, it would appear strange that some chickens do not develop the disease before the eleventh day. It is pointed out, however, that during the first few days the chickens seem to have considerable resistance to the infection and cases of coccidiosis are not seen before the eleventh day at the very earliest.

If chickens are kept on wire-netting floors (*e.g.*, in a battery brooder) for three weeks, and then transferred to infected runs at the age when they are most susceptible, a peracute attack of the disease may be expected, and may kill most of the chickens. If, however, the chickens are placed on the ground about the fifth to the seventh day and at this time pick up a light infection, then some degree of resistance to the disease may have been developed. This may result in the disease running only a mild course.



An Acute Case of Coccidiosis.
The two "blind guts" (*caeca*) are distended with blood. Normally they are no larger than the intestine in the centre.
[*Specimen by courtesy of J. K. Hutchison, B.V.Sc.*]

It is obviously by far the best course to avoid infection altogether. Where this is impossible owing to the impracticability of control measures set out herein, it will be found advisable to place the chickens down on a solid floor at the end of the first week. A high degree of cleanliness should then be maintained to minimise the infection, and any mild outbreak which occurs should be treated.

Symptoms.

In the very severe (peracute) form, seen at the beginning of an outbreak which starts when

highly susceptible chickens (three weeks old) are heavily infected, the disease rapidly runs its course. The chicks go off their feed, droop, pass blood in the droppings and die, within a few hours of first showing symptoms.

In less acute forms—seen where the chicken's resistance to the infection is greater—the disease runs a more protracted course. The chickens become weak and depressed, and stand huddled together in a drooping attitude, being quite apathetic to food or other outside stimuli. Diarrhoea is a prominent feature. "Straining" indicative of abdominal pain may be noted. The bad cases show blood in the droppings; subacute and chronic cases do not pass blood; thirst is evident. Owing to general weakness and fever the chicken may be unable to stand; this should not be confused with leg weakness due to mineral and vitamin deficiency. The majority of the birds that are going to die do so in one to five days after first showing symptoms.

Bad feeding, bad brooding management and "chills" all increase the severity of the disease by lowering the chick's disease resistance.

Where chickens have been subjected to a light infection at about a week old, and are from that time kept under the best conditions of feeding and brooding, the symptoms may only be mild. A proportion of chickens will become listless and develop diarrhoea, which persists for a week or ten days; some may die and a few of these may show specks of blood in the droppings.

Appearance on Post-mortem.

The main changes are to be seen in the two blind guts or caeca. In the very acute type these will be greatly distended with blood and semi-solid exudate. On removing this nearly all the lining membrane is seen to be haemorrhagic and inflamed.

In less acute cases the caeca will be distended with solid or semi-solid caseo-purulent material; this may be tinged or spotted with blood. The walls of the caeca are thickened and show patches of reddening.

The membrane lining the first part of the intestine is often greatly inflamed, and the contents are dirty-grey and thick instead of the normal yellow soft consistency.

Though the symptoms are characteristic, absolutely positive diagnosis can only be made by examining the bowel wall or the droppings under the microscope and finding coccidia.

How Chickens are Infected.

Adult fowls carry coccidia without showing any symptoms. The farmer coming from the fowl yard into the brooder carries on his boots a few coccidia, and distributes them on the floor of the brooder.

It is regularly noted that when the disease first appears in a batch of chickens, the infection may be light, and perhaps only a few chicks die. Later batches of chicks which occupy the infected premises experience increasingly severe attacks.

Chicks can only contract the disease by picking up coccidia passed by other birds. No amount of faulty management can produce the disease, though such faulty management will seriously lower the chick's resistance and increase the number of deaths.

Prevention should, therefore, be based on methods of improved cleanliness and care to avoid introducing the disease. If possible, the person who attends the brooder should not go into fowl yards. If this is not possible, a special pair of boots should be kept just inside the door of the brooder house, and put on before going amongst the chicks. This will also prevent another disease (Pullorum) being introduced. Wearing rubber boots and disinfecting them before entering the brooder is not completely effective against coccidiosis, as the coccidia are not killed by ordinary disinfectants.

Control and Treatment.

When a mild outbreak of the disease occurs it may be sufficient to institute a rigid method of frequent cleaning of the runs. Chickens can only be further infected by coccidia from droppings of other affected chickens. The droppings should, therefore, be cleaned up once or, if possible, twice daily. After cleaning out, lightly dust the floor of the brooder run with sand to prevent the droppings sticking to the floor. Usually this frequent cleaning will make it essential to engage more labour, and in view of this it is often cheaper and certainly more effective to proceed as in the case of a severe outbreak.

When a severe outbreak occurs, kill those chicks showing symptoms. Place the rest on wire-netting floors and make feed and

water available in such a way that the droppings cannot contaminate them, preferably using the method adopted in battery brooders. The wire-netting floors may be provided by making light frames which exactly fit the brooder and brooder run. Great care must be taken to make these frames so that the netting does not rest directly on the wooden framework, as in this case the droppings are caught on the woodwork and the chickens are as a result infected almost as effectively as if on a solid floor; wire or ¼-inch steel may be used to support the netting. The infected droppings fall straight through the netting and should be collected fairly frequently (at least once a week) from below. As in severe outbreaks the droppings are blood-stained, the chickens are attracted by the colour, immediately begin to pick at the material and in consequence become heavily infected. Any fault in the construction of the netting flooring which leaves droppings available to the chick will obviously nullify the benefit of the outlay. The netting arrangement should, therefore, be examined critically from this standpoint.

Many drugs have been experimented with in connection with the treatment of coccidiosis in chickens, but the only one concerning which satisfactory reports have been issued is colloidal iodine, and even here experimental work has not regularly supported field observations. The best that can be said is that it aids in the control of the disease but cannot be regarded as a complete cure. When administered in drinking water, care must be taken that no other water supply is available to the chickens at all, even for a brief period; otherwise they will not touch the medicated water.

The use of milk and milk products has also been widely advocated; here again experimental evidence is not altogether favourable so far as direct control of the disease is concerned, but there is evidence that the growth rate of the chickens is improved by its use. The same has been recorded with the use of iodine.

Coccidiosis is most emphatically one of the diseases in which good sanitation and cleanliness are of high value.

Infected droppings should not be used as manure on the areas on which green feed for the poultry is growing as this is one of the methods by which the disease can be spread.

Where wire-netting floors are used to control the disease, a note of warning must be given. If chickens are kept on netting, quite apart from any infection, until they are most highly susceptible (three or four weeks old) and then placed down on infected runs, a very heavy mortality will be experienced.

Pure Seed.

Continued from Page 552.

Cauliflower—
Nugget Mrs. M. Wood, March-street, Richmond.

Tobacco—
Yellow Prior
White Stem Orinoko
Goldleaf
Crutcher
Warne
Hickory Prior ...
Cash
} Manager, Experiment Farm, Bathurst.

Onions—
Hunter River Brown P. Morandini, " Riviera," Dubbo.

Kikuyu Grass Roots ... E. V. Reardon, " Kyeema," Kingsvale.

Cucumber—
Early Fortune ... W. Parry, Terrigal.

Pumpkin—
Queensland Blue ... P. Morandini, " Riviera," Dubbo.

Tung Oil Seed—
(*Aleurites Fordii*) ... T. J. Wallent & Son, Gosford-road, Wamberal.

THE AGRICULTURAL BUREAU'S PAGE.

Research and the Farmer.

The Role of Educational Organisations.

THE objectives of the Agricultural Bureau of New South Wales are a more stable industry for the man on the land, a more satisfying life, and the development of efficient community spirit and community effort. The policy of self-help on the one hand, and of concerted effort on the other, to provide for the fullest possible utilisation of all services, is constantly preached by all Bureau workers.

The technical side, the commercial side, and the social side of the farmer's life all offer scope for Bureau activity, and the value of the service rendered by the individual branch depends largely on how well the organisation is made to operate with respect to each and all of these three lines of activity. Each branch of the Bureau is at all times entirely responsible for its own selection of activities, as for every other aspect of its work, and it follows that the service rendered by a branch is proportional to the service rendered to it by its own members.

Many branches devote the bulk of their time to the development of a practical educational programme, designed to solve some of the many problems of a technical nature that are continuously presenting themselves.



The Department of Agriculture Building.
The area in front of these offices is now known as Farrer Place.

The Value of Research is Appreciated.

While it is true that no country has ever solved all of the technical problems concerning its primary producers, and it is, of course, likely that no country ever will, practically every country in the world has appreciated the need for research, and has developed work along various lines. A vast amount of research has thrown light on a multitude of difficulties, and by a system of exchange of literature and scientific data, the whole of the fruits of the world's research are made available in every country for the practical guidance of the individual producer. The value of this research is great from the scientific point of view, while its economic value is increased as those educational channels are developed through which the data and facts may be taken quickly to the farmer in a form which will make an appeal to him by their simplicity, logic, and the possibility of their direct application by himself to his own problems, even though he may inherently distrust what he conceives as science or theory. Such methods will quickly develop an appreciation of how greatly science has contributed to practice, how true it is that applied science is the most practical thing in the world, and how great are the possibilities of science simplifying and solving many existing problems.

Our Own Institutions.

In our own State we have such great institutions as the Faculty of Agriculture at the University, with its classes, its research laboratories, its graduates; the Council for Scientific and Industrial Research, with its field and laboratory research, its McMaster Institute; the Department of Agriculture, with its field and laboratory research, its Experiment Farms, its College, the Glenfield Veterinary Research Station, Botanic Gardens, and its staff of trained field officers in every branch of agriculture and allied industries, its *Agricultural Gazette* and its literature—the whole working more or less in collaboration and providing a wonderfully organised service of investigation and instruction, designed with the one definite object of facilitating, encouraging and developing the agricultural and allied industries.

The Department of Agriculture has a definite educational policy so far as the man actually engaged in agriculture is concerned. The *Agricultural Gazette* and departmental publications are freely available, supplemented, where possible, by such personal advice as can be obtained by correspondence, and, of perhaps more importance, by the personal advice and demonstration that is available through district field officers specialising in the different sections of the primary industries in their respective districts.

Economic Application of Results.

But to enable maximum advantage to be taken of these facilities, organisation to use the research and in the most economic manner is necessary, and the Agricultural Bureau is an organisation of producers organised to co-operate with the Department of Agriculture, to assist the Department to develop its service of personal advice, demonstration and instruction.

Amongst the district field officers of the Department already referred to are veterinary officers, sheep and wool instructors, agricultural instructors, dairy instructors, fruit instructors and agrostologists, and while each of these can and does meet with thousands of farmers as individuals, he is able to increase tremendously his range of personal contacts where the farmer will provide that organisation which will allow him to meet them in groups for the discussion of common problems and for the demonstration of facts of common interest.

> The *Agricultural Bureau is organised to provide practical co-operation between the Department of Agriculture and the farmers in any locality. The Department of Agriculture can give sound, practical advice on all matters connected with primary production.*
>
> *Women in rural districts are also welcomed as members, and their needs are catered for.*
>
> *Have you a branch in your locality? Full information as to the formation and working of a branch is available on application to the Under Secretary, Department of Agriculture, Box 36A, G.P.O., Sydney.*

Such grouping of the farmers for this service can be effectively done in any locality. It is being done by approximately 500 branches of the Agricultural Bureau embracing some 14,000 to 15,000 farmers, and forming a State-wide brotherhood actuated by the one definite ideal of providing vocational adult education through organised determination to use the service which is available.

Extension of Time for Removal of Mandarins

In accordance with representations made by the Fruitgrowers' Federation and in view of the abnormal drought conditions which have prevailed in mandarin districts, Ministerial approval has been given to extend the time for the removal of mandarins, except in the Murrumbidgee Irrigation Areas, from 30th September to 31st October, 1935. This concession will be applicable only in cases where there is no infection of the mandarins by fruit fly.

Tubercle-free Herds.

THE following herds have been declared free of tuberculosis in accordance with the requirements of the scheme of certifying herds tubercle-free, and, unless otherwise declared, this certification remains in force until the date shown in respect of each herd :—

Owner and Address.	Number tested.	Expiry Date.
		1935.
H. E. A. & V. White, " Belltrees," Scone ...	67	2 Oct.
W. Newcomb, " Minnamurra," Inverell ...	85	6 "
Liverpool State Hospital and Home... ...	104	11 "
E. P. Perry, Nundorah, Parkville (Guernseys)	25	13 "
J. Lowrey, Gum Flat Road, Inverell ...	68	15 "
Wm. Thwaites, " Lansdowne," Inverell ...	51	16 "
Dr. H. V. Hordern, Park Lands, Berry (Jerseys)	39	16 "
H. H. Hinton, Holbrook	15	16 "
Limond Bros. Morisset	43	17 "
F. L. McGufficke, Eastbourne, Inverell ...	95	18 "
Australian Missionary College, Cooranbong...	62	19 "
W. S. Turnbull, Flanders Avenue, Muswellbrook	37	27 "
James McCormack, Tumut	81	28 "
Forster & Sons, Abington, Armidale ...	247	31 "
E. E. McMullen, Springnook, Holbrook ...	37	9 Nov.
C. Maynard, Holbrook	12	9 "
E. S. Cameron, Big Plain, Narrandera ...	39	21 "
C. Wilton, Muswellbrook	108	28 "
Lunacy Department, Callan Park Mental Hospital	30	30 "
A. Shaw, " Ardshiel," Craven Creek, Barrington (Milking Shorthorns)	141	6 Dec.
Department of Education, Gosford Farm Homes	31	13 "
Riverstone Meat Co., Riverstone Meat Works, Riverstone...	97	13 "
St. Patrick's Orphanage, Armidale	16	13 "
Newington State Hospital and Home ...	100	19 "
Berry Training Farm, Berry	170	20 "
Department of Education, Brush Farm, Eastwood	11	20 "
		1936.
E. L. Killen, Pine Park, Mumbil	41	9 Jan.
G. V. Ralston, " Porphyry " Seaham ...	126	10 "
Lunacy Department, Morisset Mental Hospital	53	18 "
New England Experiment Farm, Glen Innes (Jerseys)	29	24 "
C. J. Parbery, Allawah, Bega	105	31 "
J. F. Chaffey, Glen Innes (Ayrshires) ...	69	31 "
A. A. Campbell, Breadalbane, Mullumbimby (Guernseys)	55	27 Feb.
A. B. Finney, Fox Ground, Gerringong ...	35	8 Mar.
Department of Education, Yanco Agricultural High School	54	8 "

Owner and Address.	Number tested.	Expiry Date.
		1936.
Riverina Welfare Farm, Yanco	108	8 Mar.
Bathurst Experiment Farm (Ayrshires) ...	13	15 April.
New England Girls' Grammar School, Armidale	32	18 "
Cowra Experiment Farm	34	25 "
G. Goodchild, " Calala," Tamworth	66	15 May.
Lidcombe State Hospital and Home ...	170	22 "
Lunacy Department, Gladesville Mental Hospital	28	22 "
The William Thompson Masonic School, Baulkham Hills	47	23 "
A. L. Logue, " Thornbro," Muswellbrook ...	46	30 "
W. E. J. Goodwin, Wybong Road, Muswellbrook	27	30 "
K. W. D. Humphries, " Karoola," Muswellbrook	249	30 "
H. R. Provins, " Happy Valley," Inverell ...	21	31 "
H. F. White, Bald Blair, Guyra (Aberdeen Angus)	352	7 June.
G. L. Genge, " Easton," Armidale	42	13 "
Hawkesbury Agricultural College, Richmond (Jerseys)	121	14 "
Miss N. C. Brennan, Arrankamp, Bowral ...	18	3 July.
Koyong School, Moss Vale	2	4 "
Tudor House School, Moss Vale	21	4 "
Hurlstone Agricultural High School, Glenfield	54	19 "
Navua Ltd., Grose Wold, via Richmond (Jerseys)	58	16 Aug.
W. W. Martin, " Narooma," Urana Road, Wagga	139	26 Sept.
Wolaroi College, Orange	20	12 Nov.
Lunacy Department, Parramatta Mental Hospital	17	28 "
Stace Bros., Taylor Street, Armidale ...	20	13 Dec.
Wagga Experiment Farm (Jerseys)	62	13 "
St. Patrick's College, Goulburn	9	18 "
George Rose, Aylmerton	4	19 "
		1937.
Wollongbar Experiment Farm, Lismore (Guernseys)	112	14 Jan.
R. C. Dixson, Elwatan, Castle Hill (Jerseys)	23	12 Feb.
Lunacy Department, Rydalmere Mental Hospital	60	22 May.
Lunacy Department, Kenmore Mental Hospital	95	30 "
Puen Buen Ltd., Scone (Jerseys)	219	25 July

Tubercle-free Areas.

The following Areas have been declared tubercle-free and no cattle are allowed to be kept therein unless subjected to the tuberculin test and found free from tuberculosis :—

Bombala Area.

Inverell Area.

Municipality of Muswellbrook.

Municipality of Queanbeyan.



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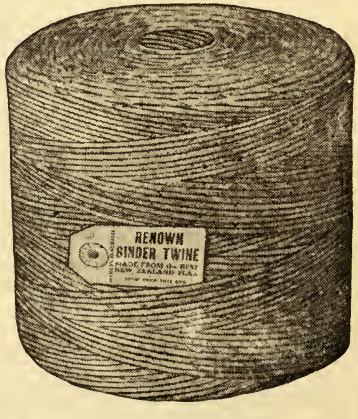
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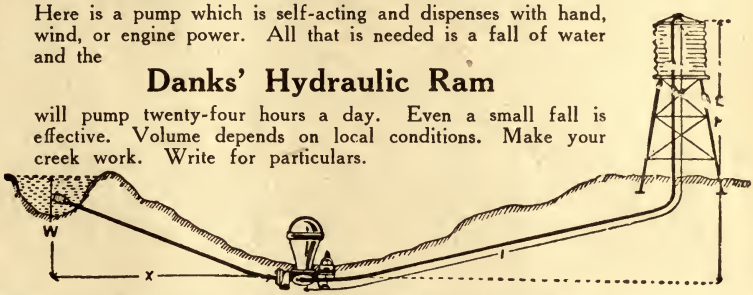


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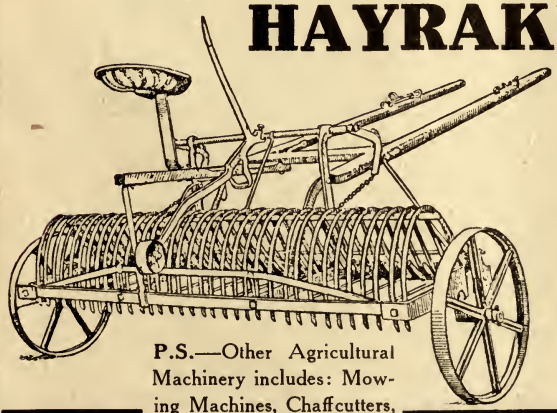
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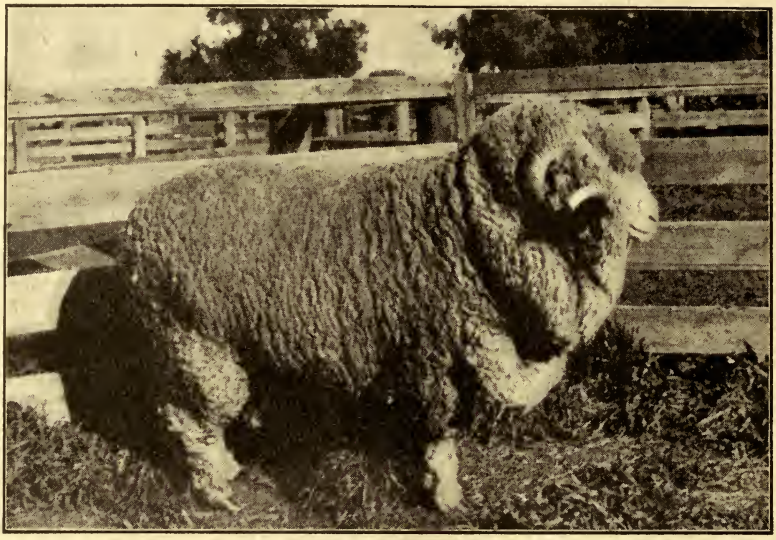
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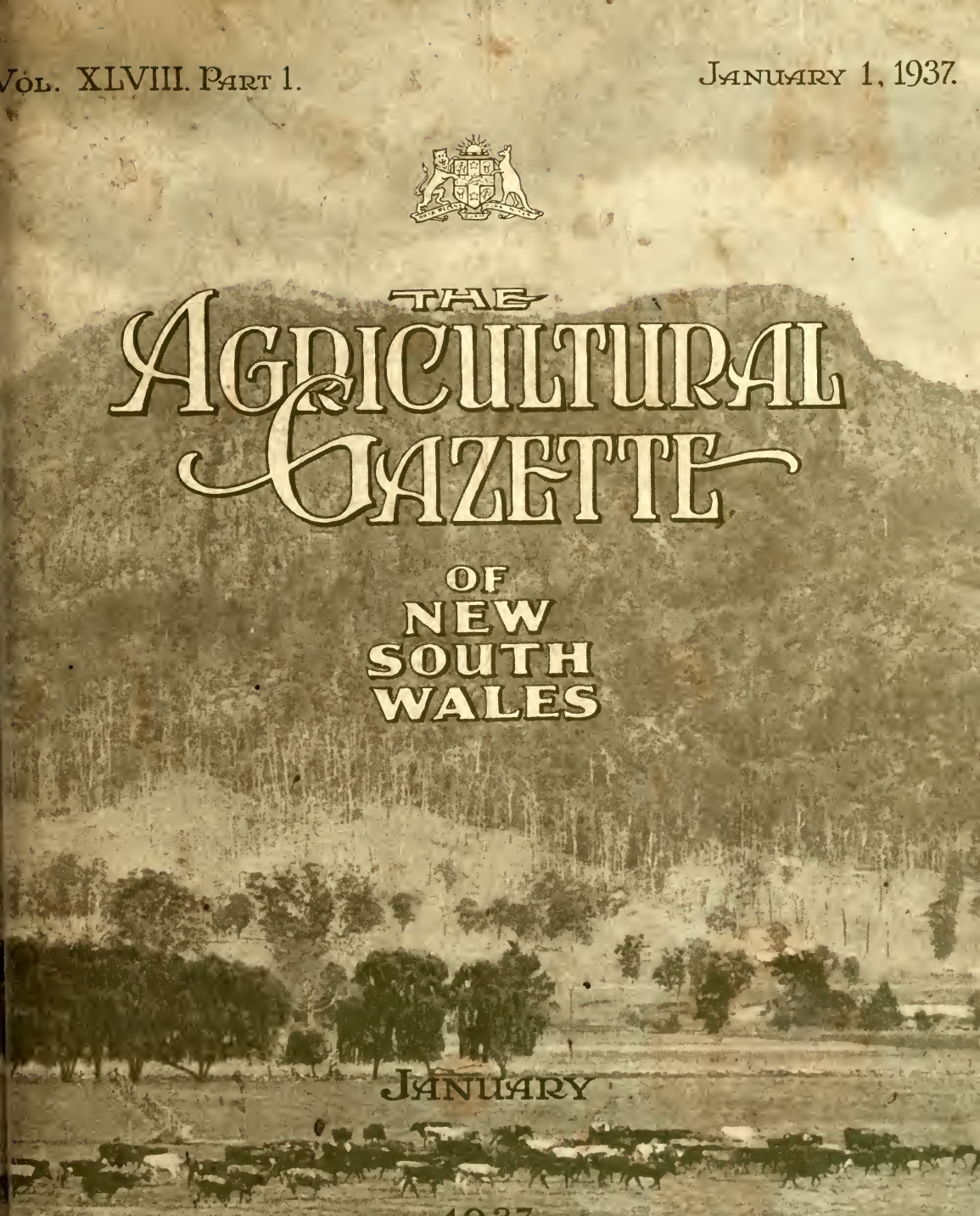
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THE AGRICULTURAL GAZETTE OF NEW SOUTH WALES



JANUARY

1937

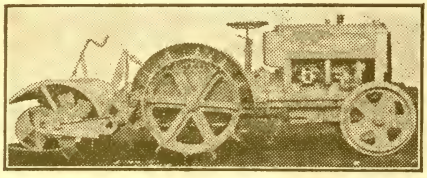
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Actual facts. **Series 7.**

WHAT WAS FORECASTED versus WHAT WAS FOUND

Well known and well esteemed, in the Raymond Terrace district, is Mr. L. Shearman. A successful practical farmer and a man whose word is relied upon by all who know him, we append his answers to questions recently put to him.



HOWARD MODEL "22."

Q. How long have you had your "22" outfit?
A. Two years.
Q. How many were in your district prior to that?
A. One Rotary Hoe on a ———————— tractor.
Q. Why did you buy a Rotary Hoe?
A. I was impressed with the work of the ———————— but considered the Howard "22" better suited for my work.

Q. What was the general attitude of the people around you?
A. They thought I was buying a white elephant.
Q. What harm did they expect to happen?
A. Pack the soil and create hard pan.
Q. What actually did happen?
A. Perfect cultivation—better crops, particularly in dry seasons—and no hard pan.
Q. How many acres do you estimate you have done?
A. From 1,500 to 2,000 acres.
Q. What was the nature of the work?
A. Ordinary cultivation, old lucerne land, and heavy sod bound paspalum paddocks.
Q. How much has your outfit cost you for repairs or replacements?
A. Roughly, £5 for the Hoe portion, but not a penny on tractor.
Q. How many sets of blades have you worn out?
A. One set worn out, second set fairly good still.
Q. We have a photograph of you ploughing in cornstalks—did you do much of that?
A. About 150 acres.
Q. What has been the effect of ploughing in the cornstalks?
A. A very good effect. On my own land which goes very hard after rain I have hoed in 2 crops in the 2 years I've had the Hoe and one could hardly believe it to be the same land. It is now nice to work and holds the moisture much better.
Q. Do you think the impression in relation to the "22" has improved in your locality since you purchased?
A. Yes, I do. There are now 12 Howard "22's" and numerous "Eights" and "Twelves" within a 12 miles radius of mine. I would not be without my "22" and I am glad we have an Australian made machine capable of doing every job on a farm.

Now Mr. Shearman is satisfied with his soil tillage equipment—are you? If you would like to hear more about HOWARD ROTARY HOES, or see one in operation on your own property—free and without obligation—just write, phone, or call.

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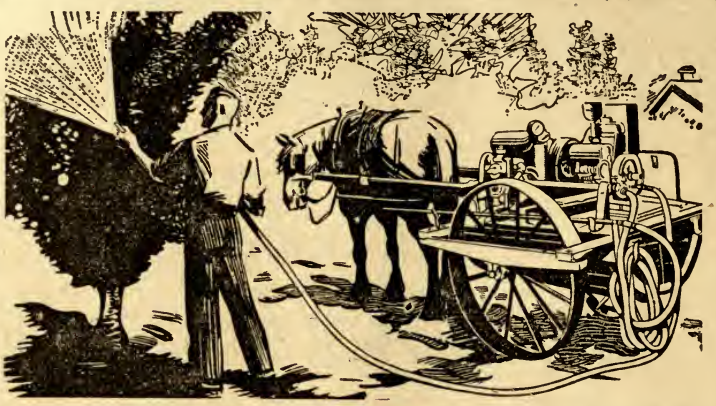
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The Ronaldson-Tippett Spraying Plant is obtainable in 10 different models to suit any orchard from 3 to 300 acres. Every machine is guaranteed to give year-in-year-out service. The forceful flow of spray never falters. You reach every leaf, every branch, making further life for pests impossible.

NOTE.—In the above illustration one of the sturdy mudguards has been removed to show constructional details.

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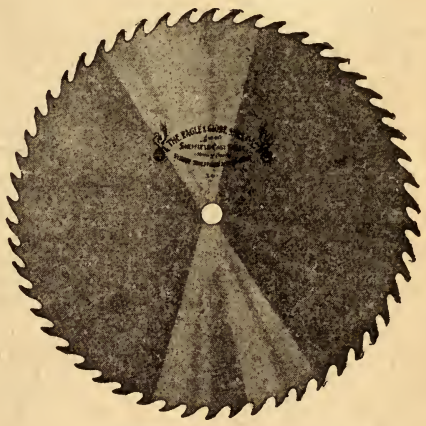
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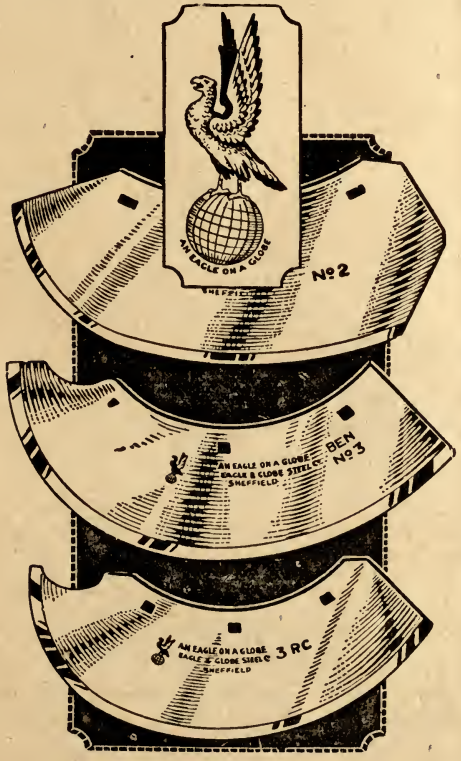
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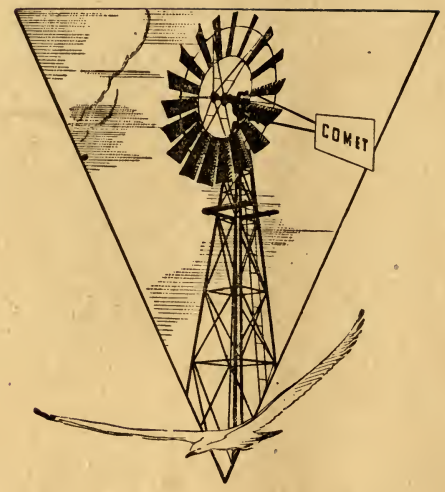
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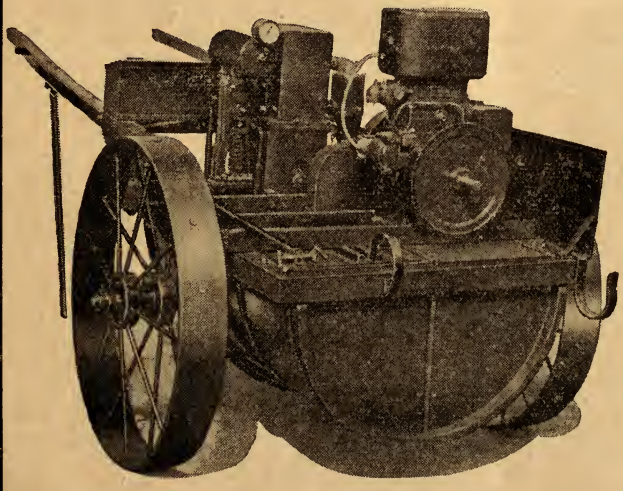


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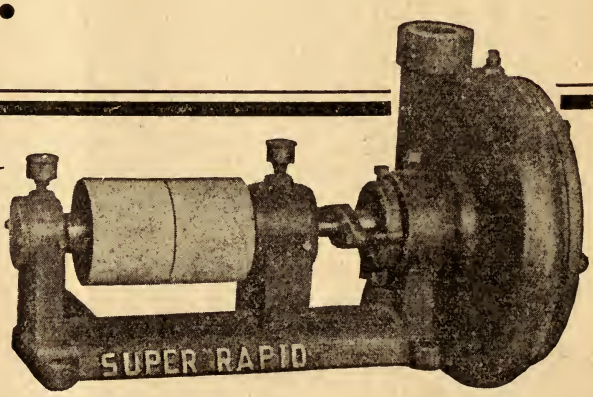
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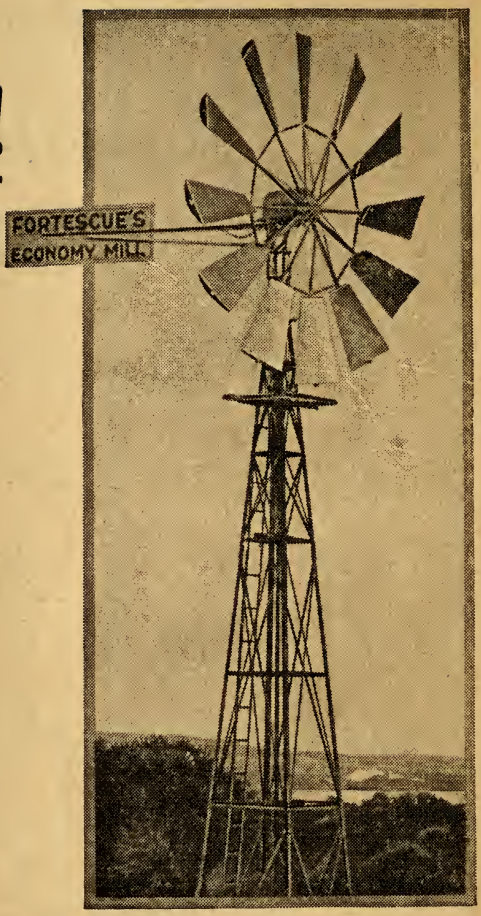
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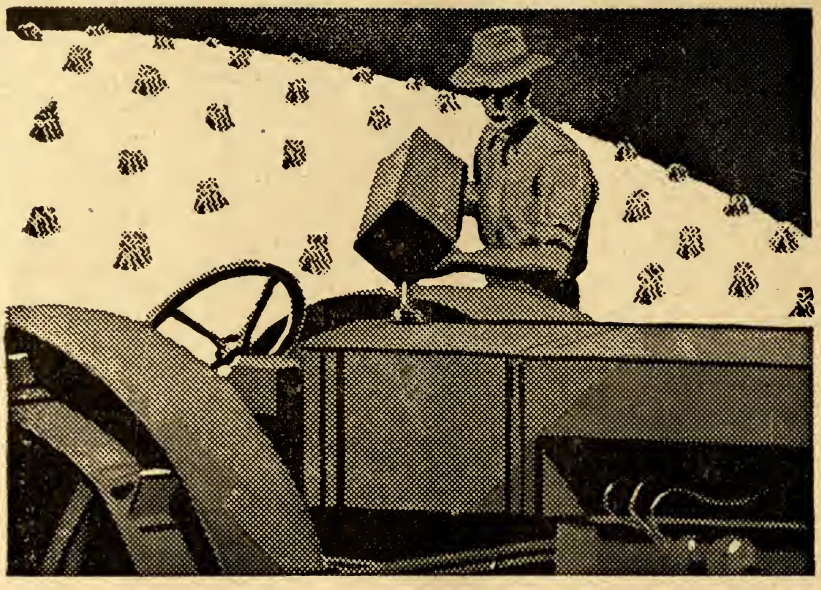
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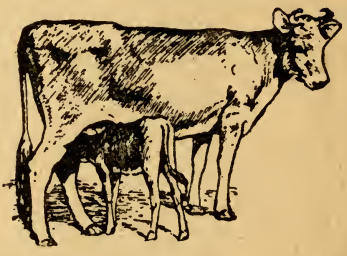
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THE AGRICULTURAL GAZETTE OF NEW SOUTH WALES

Vol. XLVIII. Part 1. January, 1937.

A NEW YEAR MESSAGE.

Once again we are heralding in a new year and must leave the last twelve months with its successes and its failures to history.

Reviewing 1936 *we find that two of our major industries in wool and wheat have enjoyed considerable prosperity. Except in isolated areas, conditions in these lines of production have been very favourable, though, unfortunately, rain during the harvest period has militated against satisfactory returns to some wheatgrowers.*

The recovery in prices for both wool and wheat is most welcome not only to the actual producers but also to the State. It will enable the country people to extend their purchases and this will stimulate employment and prosperity in our secondary industries.

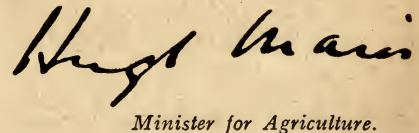
Whilst graziers and wheatgrowers may well rejoice in their change of fortune it is hoped that in pursuing their operations they will not be given to recklessness on account of the higher prices which are now ruling. This matter is, of course, entirely for the producers' own decision and much depends on each man's particular circumstances, but one must have some regard for past experiences and I simply wish to sound a note of caution to those who might be prone to gamble unduly on the assumption that to-day's figures are to operate permanently. It is extremely difficult to forecast what may happen in the future, but it is well to remember that so far as wool is concerned, if prices rise too high an incentive is created to extend investigation and manufacture of synthetic fibres. Then with wheat the tendency in the past has been to plant huge additional areas when prices were high, thus creating surpluses which in turn brought about heavy falls in values with substantial losses to many growers. Let us hope then for fair and reasonable prices and prices that will enable some stability to be maintained rather than alternate high and low returns.

I hope I will be pardoned for again drawing attention to the fact that it is in times of plenty that we should think of the less bountiful days that may lie ahead. The importance of fodder conservation cannot be too strongly emphasised in this regard.

It is with regret that I cannot record that the past year has been a successful year for the dairying industry. In quite a number of areas it has been the worst season experienced for many years and returns have fallen to such an extent that financial aid through Governmental channels has been necessary to enable producers to carry on their operations. Dairy factories have co-operated generously with the Government in helping to tide necessitous dairymen over a most difficult time and I sincerely hope that in 1937 *they will enjoy far greater fortune than the year just closed.*

The fruit and poultry industries have also had their share of difficulties, but the partial removal of the citrus embargo is a happy augury and indicates that future prospects are brightening for the citrus growers.

Reviewing rural production generally, I feel we may enter the new year with a great deal of confidence and I think all sections of the community will join with me in the hope which I now express that the year 1937 *will bring prosperity to every phase of rural activity, realising as they must that if the primary producer has the spending power then all will benefit, whereas if he suffers then his misfortune must react detrimentally to the rest of the State. My colleagues in the Ministry and the officers of my Department unite with me in voicing these sentiments.*



Department of Agriculture,
Sydney, 1st January, 1937.

Minister for Agriculture.



To Place Wheat Growing on a Sound Basis.

G. NICHOLSON, H.D.A., Senior Agricultural Instructor.

UNTIL recent years a most common practice among wheat growers in the Mudgee-Coonabarabran district was to crop the land continuously to wheat for a period of years, until such time as it became unproductive, due to excessive weed growth, and then transfer their farming activities to new land, allowing the worn-out and often eroded cultivation area to revert to pasture. This uneconomic system could not go on indefinitely, as the area of virgin country suitable for cultivation is diminishing. Fortunately, both for the sake of the individual and the State, this wasteful system of farming is giving place to-day to more progressive methods, and farmers are sowing down their old cultivation paddocks to lucerne.

In this article Mr. Nicholson suggests a rotation that will not only maintain the fertility of the wheat land and suppress weed growth, but will give a satisfactory annual cash return from the land, reduce cultivation costs, provide winter grazing and a fodder reserve.

DURING recent years the wheat-growing industry has expanded very rapidly in the district between Mudgee and Coonabarabran, especially from Dunedoo to Baradine, in which area the increase has been over 300 per cent. in the past eight years. The area of new land suitable for farming is, however, becoming less each year, especially on the smaller properties, though on the larger holdings, large areas of excellent country for wheat growing are still available.

Primitive Methods Uneconomic.

The methods of growing wheat, too, are changing, and the somewhat primitive system of continuous cropping with wheat, with its resultant injurious effect on the yield and the soil, is being superseded, in some instances, by more scientific methods.

It has been a marked feature of the crop competitions in this district that a large number of entries are crops grown on new cultivation land—in 1935, the percentage was 58, with only 14 per cent. on old cultivation.

From this it is reasonable to deduce that the older cultivation areas are growing inferior crops. By giving a short summer fallow, land that is not far removed from its virgin state can be successfully cropped to wheat for a number of years, the number of high-yielding crops that can be grown depending partly on the inherent fertility of the soil, but governed largely by the efficiency of the farmer. Weed growth by exerting a depressing effect on the yield is usually the deciding factor.

In this area the bulk of the farming soils range from light, sandy loams to medium-heavy, red and brown loams, and it is to the cropping of these soils that the following notes apply. Heavy, friable self-mulching loams do occur in parts, but these are not to be discussed in this artcle.

Winter Fallowing Not Popular.

Winter fallowing in preparation for the sowing of wheat the following autumn is a practice which has not been widely adopted by farmers in the Mudgee-Coonabarabran district. There are a number of reasons why long fallow is not popular in this portion of the State, the principal objections being:—

1. The comparatively small percentage area cropped in comparison to the total area of the properties. This has provided for a disorganised form of rotation.
2. New land has been readily available for cultivation.
3. Difficulty of keeping weed growth in check and fallows in good order during the summer months.
4. A lower standard of farming, due firstly to a favourable climate and rainfall, and secondly to good crops being grown on the better class soils with but scant cultivation.

Winter fallow as practised in the southern districts cannot be considered as entirely satisfactory for this area. In fact, it is not uncommon to see a well-managed short fallow, under identical conditions, outyielding a long fallow that has been neglected over harvest. Many of the soils are not sufficiently retentive to hold the winter rains in the sub-surface soil until the following autumn, and as a general rule the summer rains are sufficient to replenish subsoil moisture reserves; from the aspect of moisture conservation, therefore, winter fallow is not justified.

To be successful with winter fallow in this district it is essential that the paddocks be not too big; that stock be available to provide heavy stocking to check the growth of summer weeds, and that ample plant and power be available to cultivate the area quickly after rain. The frequency of heavy summer rains on fallow, provides favourable conditions for sheet and gully erosion and the growth of summer weeds, principally love grass and camphor or crested goose-neck weed. When moisture conditions are favourable, love grass grows with such alarming rapidity that small paddocks are essential to permit of grazing. It is seldom that a satisfactory crop of wheat follows a heavy growth of love grass.

Another point that weighs very strongly against long fallow with the average mixed farmers is the fact that he is averse to sacrificing or not in a position to sacrifice any grazing during the winter months, for invariably pastures are sparse, from mid-June to early September. On the light loams, couch grass is a serious weed pest and fallowing encourages its rapid growth and spread.

Weeds, Diseases and Decreased Fertility Follow Summer Fallow.

On the other hand, the time available for short, summer fallowing is limited, for if it is to be successful, the initial ploughing or cultivation must be done early in the year. Moreover, a summer fallow does not assist to control the growth of winter weeds, such as wild oats, mustard, saffron, thistle, etc., or check the spread of disease, and the organic content of the soil is reduced.

The control of weeds and of disease and the maintaining of soil fertility by building up humus reserves, are the three principal factors over which we have some control, and these largely determine crop yields. The high yielding crops that are grown, with but scant cultivation on new lands, are largely due to the absence of weed growth and to a higher organic content.

Requirements of a Crop Rotation.

A crop rotation to be suitable for this district must be one that will give a satisfactory annual cash return, reduce cultivation costs, provide winter grazing, a fodder reserve, and at the same time repress weed growth and maintain fertility.

A long range rotation considered suitable would be one extending over fifteen or sixteen years. Commencing on new cultivation land or an old lucerne paddock that is free from harmful weeds, the land would be fallowed in the spring, and then grow wheat for three years in succession, *i.e.,* one crop on fallow and two succeeding crops on short fallow. Following the third crop of wheat the paddock would be sown to oats to be used for grazing and then allowed to mature for hay or grain. If sown early, say, mid-March, the oats will provide good grazing in an average year from May to July (inclusive). The resultant crop would provide a fodder reserve and some would be available for sale. The following year oats would again be sown for grazing and to be fed off bare, when the paddock would be ploughed about October. Then would follow three crops of wheat in succession, and two oat crops—the former for grain and the latter grazed off. Fallow would follow in readiness for sowing wheat, lucerne and Wimmera rye grass the following autumn.

The plan of the rotation, commencing with a fallow crop in 1936, would be as follows:—

Plan of Rotation—

1935—Fallow (new cultivation or old lucerne stand).
1936—Wheat (on long fallow).
1937—Wheat (on summer fallow).
1938—Wheat (on summer fallow).
1939—Oats (for grazing and hay or grain).
1940—Oats (for grazing—land ploughed prior to harvest).
1941—Wheat (on spring fallow).
1942—Wheat (on summer fallow).
1943—Wheat (on summer fallow).
1944—Oats (for grazing hay or grain).
1945—Oats (for grazing—land ploughed prior to harvest).
1946—Wheat, lucerne and Wimmera rye grass (on spring fallow).
1947-1951—Lucerne-rye pasture.

The lucerne and Wimmera rye grass would provide grazing for five to six years and towards the end of the period oats could be drilled in on top of the lucerne.

In commencing a rotation similar to the one outlined, it is essential that the land be free from harmful winter weeds, in particular wild oats and saffron thistle. It is therefore desirable to commence on new country or country that has been under lucerne for a number of years. The growing of the grazing oat crop would be equivalent to a long summer fallow, so far as weed control is concerned.

Because of seasonal conditions and other unforeseen circumstances it is almost impossible to follow any hard-and-fast plan, and alterations in any rotation are inevitable. However, not more than two wheat crops in succession, one year removed from fallow should be grown. Provision must also be made for the inclusion of a green manure crop about every four years. This is an intensive rotation, and there will be a steady drain on the mineral content of the soil, hence crops should receive a liberal application of superphosphate. At first sight it may appear that the plan of cropping is too intensive.

Examples of Successful Rotations.

Some lands in this district that have been well managed have been cropped almost continuously for fifty years, and they are still productive. The results of a rotation experiment conducted by Messrs. Robinson Bros., of Tallawang, without a break for twenty years, are of especial interest. The soil, a brown conglomerate silt loam, may be classed as only average quality. The paddock, one of the oldest cultivation areas in the Tallawang district was considered as worn out for farming purposes twenty years ago. Though cropped continuously since 1916, alternating wheat with oats, the latter for grazing, yields have been well maintained, and for the past three years have exceeded 33 bushels per acre, as compared with the Gulgong district average over the same period of 12 bushels.

This long course rotation provides for an adequate supply of grazing during the winter months when green feed is at a premium. The amount of grazing that the oat crop will provide is dependent on the class of country, time of sowing and the season. An average figure would be five sheep per acre for the seven months' period April to October (inclusive).

(*Continued on page 9.*)



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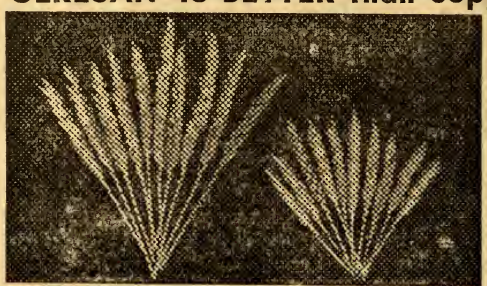
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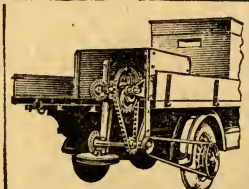
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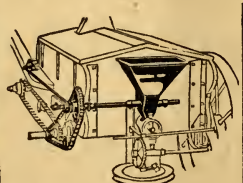
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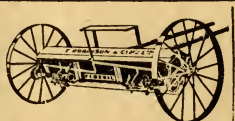
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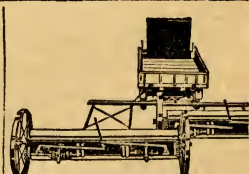
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Sown Pastures at Bibbenluke.

Monaro Pastures.

Top-dressing—Sown Grasses and Clovers—Grazing Lucerne.

JOHN L. GREEN, H.D.A., Agricultural Instructor.

THE improvement of pastures, co-ordinated with the use of conserved fodders as supplementary feed during the severe winter months, is the best and most economical method of increasing the carrying capacity and productivity of country on Monaro. In addition, the health of the stock is improved by the better quality of the feed obtained from improved pastures.

The climatic conditions on Monaro are favourable to pasture improvement, particularly so in the higher rainfall centres, such as Bombala and Adaminaby. Because most of the pasture work to date has been done in these centres, however, it should not be concluded that localities like Cooma and Queanbeyan are not suitable for the work. On the contrary, numbers of graziers in these last-mentioned districts have practised pasture improvement work with success.

Eradicate Rabbits and Subdivide.

The first essential is to have the property free of rabbits and netted, so that when better quality grazing is available it will not be for the rabbits, but may be reserved for the stock. Fortunately, rabbits generally are well under control in this district, and cannot be considered a deterrent to pasture work.

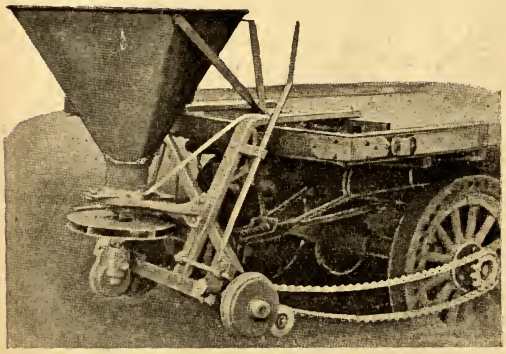
The next step is to have the property well subdivided, or at least those paddocks which it is intended to top-dress or sow with grasses and clovers. Subdivision into controllable areas should be the first improvement carried out on any property, large or small, as it is only by this means that the best will be obtained from any improved pastures. It is not possible to suggest exact areas for the different paddocks, as each property presents peculiar features of its own. Generally stated, however, top-dressed natural pasture paddocks should be in areas of 200 to 500 acres, and ploughed and sown pastures in paddocks of 10 to 50 acres. Definitely, sown pastures should be

in small separate paddocks, and not part of a large paddock. The same refers to lucerne, although it is realised that in some instances, particularly around Cooma, and with grazing lucerne, it is not possible to observe this condition, owing either to the topography of the country or the stony nature of the land.

Methods of Improvement.

There are two main methods of improving pastures; one is to broadcast subterranean clover and superphosphate on the natural pastures, and the other is to plough and sow down either a complete pasture mixture or grazing lucerne.

Lucerne growing on Monaro has been fully dealt with in this *Gazette* for February, 1934, and as reprints of this article are available from the Department of Agricul-



A "Broadcaster" Attached to the Back of a Lorry.

ture, only casual and occasional reference will be made to lucerne in this present article.

Each of the two methods of pasture improvement mentioned has its place on every property, soil condition and quality, area of holding and class of stock being the main influencing factors determining the relative areas of each. On large holdings it is not feasible to plough large tracts of country solely for the purpose of sowing improved pastures, and on these the use of subterranean clover and superphosphate must be considered the major method of improving the broad acres. On small properties, where it is desired to stock to capacity, ploughing and sowing of pastures and grazing lucerne should be carried out as much as possible.

Improving Natural Pastures.

The broadcasting of subterranean clover and superphosphate on the natural danthonia-stipa-agropyrum-trifolium - medicago pastures of Monaro has proved itself sound practice. In the Delegate, Bombala, Cathcart, Bibbenluke, Nimmitabel, Bungarby, Adaminaby and Queanbeyan districts many properties are to be seen with paddocks improved in this way. In the Cooma, Berridale, Dalgety and Michelago districts there has not been the same degree of satisfaction from the use of subterranean clover and superphosphate, but it must not be forgotten that until the last few years the seasons in these centres have been well below the average as regards rainfall. As an example, Cooma, with an average annual rainfall of 19 inches (sixty-one years records), recorded 1,498 points in 1929, 1,057 points in 1930, 1,313 points in 1931, 2,000 points in 1932, and 1,711 points in 1933. Any pasture improvement work with subterranean clover and superphosphate since 1933 has shown excellent results, no doubt helped by the favourable seasons, as each of the past three years has had a rainfall above the average. Taking into consideration the results obtained in what would be considered a normal year, it can be safely stated that, if due care is exercised in selecting the country to be treated, and general recommendations for the work are followed, the borderline districts will give payable responses. Particularly would this be so if the first two seasons following the sowing of the subterranean clover were favourable to its growth, development and seeding. Once established it would withstand dry years without disappearing from the pastures. It is in this direction that the risk is to be taken, but it is a reasonably safe risk, as lack of autumn and spring rains is not a feature of the Monaro climate.

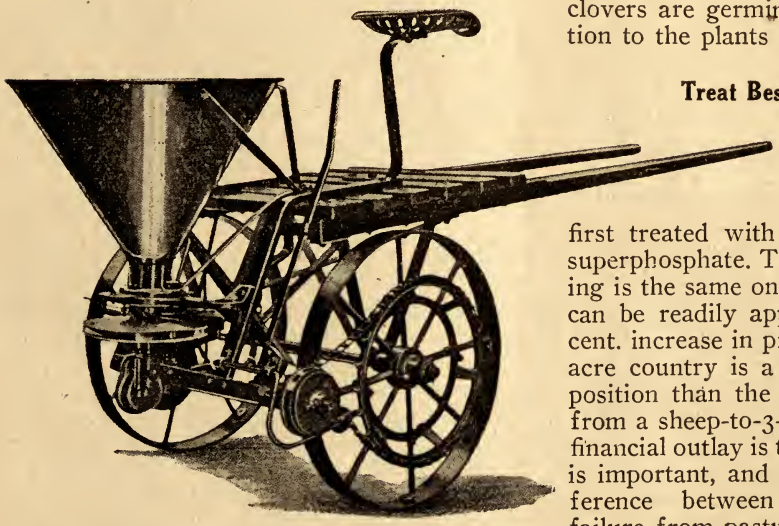
When to Sow Subterranean Clover.

Of the few simple fundamentals which must be observed in order to ensure success when broadcasting subterranean clover and superphosphate, the most important is the time of doing the work. Almost invariably too late a start is made in the autumn, which is the only time to sow subterranean clover, and as a result the clover does not have a chance to germinate and establish itself before the cold weather sets in. Definitely

the best time for broadcasting superphosphate with subterranean clover is during late January and February. It is better to err on the side of earliness than lateness.

Very frequently it is observed by graziers that subterranean clover does much better in the second year than in the first season; this is mainly because in the year of its establishment it is forced to germinate whenever we choose to sow it, but in the second year it germinates of its own free will, frequently as early as the first week in February.

Subterranean clover sown as late as March or April may do fairly well, but the growth and amount of seed set, which is very important the first year, would be much less than if sown in January or February.



Complete "Broadcaster," Suitable for Rough, Hilly Country.

Under no conditions should subterranean clover be sown in the spring, as, being an annual, it does not have an opportunity to make full growth and mature before summer arrives.

Top-dressing with superphosphate alone, where it is not desired to sow clover, or the application of the superphosphate to paddocks where subterranean clover has already been established, may be carried out later into the autumn. Nevertheless, it is desirable to complete this operation by the end of March.

On properties where both phases of the work are being carried out, it is wise to do the paddocks with subterranean clover and superphosphate first, leaving paddocks on which superphosphate alone is to be applied to be done later.

It is sometimes thought that a spring top-dressing with superphosphate will encourage better growth of the clovers in the pastures, and give more feed well into the spring than if done during February. On Monaro there is no evidence to prove this, all experiments showing that pastures treated in the early autumn have given more grazing and also later spring grazing than paddocks top-dressed in July or August. Superphosphate encourages strong root development, and if applied when clovers are germinating gives solid foundation to the plants for later topgrowth.

Treat Best Paddocks First.

Under no conditions should the poorest country on the property be the first treated with subterranean clover and superphosphate. The cost per acre of improving is the same on all classes of land, and it can be readily appreciated that a fifty per cent. increase in production on sheep-to-the-acre country is a much more payable proposition than the same percentage increase from a sheep-to-3-acres land, seeing that the financial outlay is the same in each case. This is important, and frequently means the difference between financial success and failure from pasture improvement work.

Furthermore, the better-class pastures carry a higher percentage of clover growth, and, as it is from these that the main increase of quality and quantity of the grazing is obtained, it is desirable that they be well represented in the sward. On Monaro most pastures contain ball clover, suckling clover, or burr trefoil, and as each of these responds well to superphosphate, striking results are obtained from the first year of treatment.

Owing to the strong winds experienced in this district it is desirable, if possible, to select paddocks that have some natural protection. This is not all-important, but it is better to do such paddocks first, leaving open plain country to be treated at a later

date. As most of the severe winds come from the west, the Great Dividing Range acts as a break for properties on the eastern side of Monaro, whilst for the remainder the undulating nature of the country affords some protection.

Protection from Strong Winds.

It is possible to have three means of protection, and each of these should be present to get the best results. Firstly, as mentioned previously, the topography of the land should afford a break to the strong winds; secondly, some scattered timber or timber belts are desirable; and, thirdly, ground cover of grass (a factor over which the grazier has control) is necessary. This last feature is very important when subterranean clover is being sown with superphosphate. Country that is eaten bare does not afford any protection to the clover seed nor the young plant when it germinates, and it is more liable to be eaten or trampled out by stock if no growth of grass is present. Very heavily grassed country is nearly as bad as bare land, so an intermediate condition is desirable. A cover of dry summer grass, reasonably thick, and to a depth of about three inches, is ideal. Young sub. clover plants will generally be found growing about the base of tussocks or "snow grass," and this might be taken as a good indication of their need of protection.

Rates of Sowing.

At least 1 cwt. superphosphate should be sown the first year, this quantity being reduced to 90 lb. per acre in later years. On small paddocks, or where it is desired to get better and quicker results, as in ram paddocks, stud paddocks, etc., the quantity should be increased to a bag (182 lb.) per acre. The use of a quantity greater than this is not advisable, whilst anything less than 84 lb. per acre will not give satisfactory results.

With the subterranean clover 2 lb. has been for long considered the standard rate per acre, and it is still recommended. Sowing less than this amount is not wise, as 1 lb. per acre will take much longer to thicken up into a decent sward than the recommended quantity. Two pounds per acre should therefore be regarded as the minimum quantity. Rarely is it necessary to increase that amount, but it might be wisely and profitably done for certain paddocks. Such paddocks could receive up to 5 lb. per acre, the result being a good subterranean clover cover in a couple of years instead of the three or four years when only 2 lb. per acre is sown.

It is definitely recommended that no grass seed or other clovers be sown in the manner recommended for subterranean clover. This clover, by its spreading habit and peculiar manner of seeding, has the ability to thicken up in a pasture, whereas grasses, being naturally poor germinators on untilled land, do not readily seed and thicken up. The introduction of such grasses as rye and cocksfoot into the improved pastures follows after the subterranean clover has become well established and produced a soil condition able to maintain these better-quality grasses. Until this condition is brought about, any money spent on grasses or clovers other than subterranean clover would have been much better spent on increasing the quantity of superphosphate or subterranean clover and seed used.

Methods of Sowing.

Machines are available for the economical sowing of small or large areas, and fortunately such machinery is reasonably cheap.

The "spreader," or direct-drop box, can be obtained to cover widths of 6 to 12 feet, and costs from £20 to £35, depending on the size and make of the machine. The area per day which can be done with a spreader ranges from 10 to 20 acres, according to the class of country. This machine should be on every property, as it is ideal for applying superphosphate to small paddocks of lucerne or sown pasture areas, and is also excellent for sowing down such paddocks when the seed is mixed with the fertiliser.

The "broadcaster" is the only suitable type of implement to use where large areas have to be top-dressed, and as the cost of some makes is as low as £25, the initial outlay is light. Broadcasters can be purchased for attaching to a motor lorry or to a dray, or mounted on its own wheels. The first mentioned type, where the country to be top-dressed can be covered with a fast moving vehicle, is the best, and up to 200 acres can be treated in a day. For getting over rougher country the type attachable to a dray is to be preferred.

9 years at work, and not one worn out

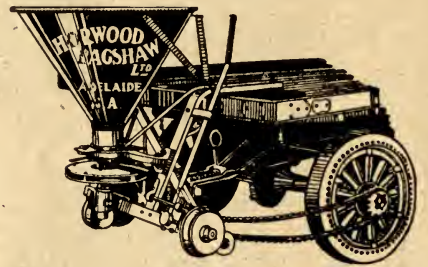
HORWOOD BAGSHAW

(Shepherd Patent)

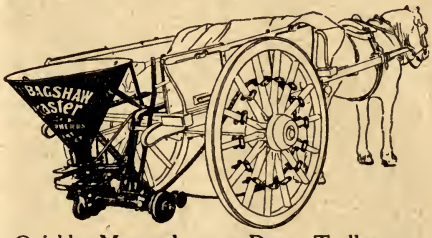
Broadcaster

There is always one superior product in every line of business. One that predominates—one that sets the pace for the others to follow—one standard by which others are judged. Such is the recognised position of the HORWOOD BAGSHAW (Shepherd Patent) SUPERPHOSPHATE BROADCASTER.

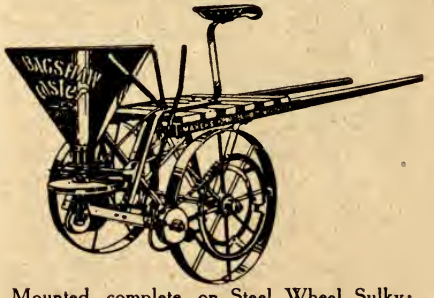
The nine years of experience behind the new improved model justifies our claim that no other Broadcaster can excel the HORWOOD BAGSHAW, for design, construction, and operation. Write for your copy of our 24 page Catalogue.



With Motor Truck Equipment. We supply drive-wheel equipment for all types of Motor Vehicles.



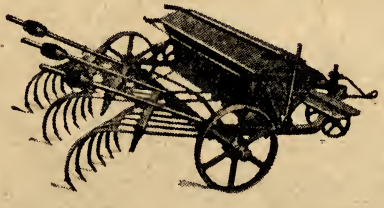
Quickly Mounted on a Dray, Trolley, or Wagon. We supply the equipment required.



Mounted, complete, on Steel Wheel Sulky; also available with balloon tyres.

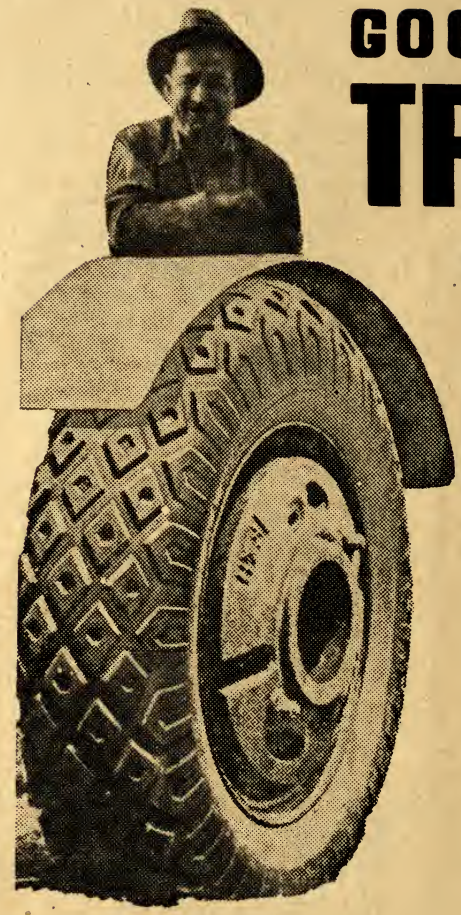
.... and here's the HORWOOD BAGSHAW "IMPERIAL" PASTURE RENOVATOR

(FORBES PATENTS)



Pasture seeds will generally "strike" when spread through a Broadcaster with superphosphate, but when it is vitally necessary to get the maximum germination and plant development the Horwood Bagshaw ("FORBES" Patent) Pasture Renovator, Manure Spreader, and Seed Sower is necessary to ensure the ground being lightly worked. This implement is also admirably suited for the renovation of existing pasture land and an illustrated catalogue will be forwarded, free, on request.

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10-TI-37.

Renovate the Pastures.

In order to provide a better seed-bed for the subterranean clover than that afforded by the natural cover of the pasture, it is desirable to renovate the land either immediately before or just after sowing the clover. It is realised that it is not feasible to renovate all the country to be top-dressed with superphosphate to which subterranean clover has been added, nor in many cases is it possible to so do, but that does not lessen the desirability of doing this work where and when practicable. A rigid-tine cultivator (stump-jump type for preference) is the best machine to do the work. Pasture harrows are not severe enough on most country, but would be better than nothing at all. Disc implements are of little value, but may be used if others are not available.

Where the pastures have been eaten bare in the autumn, it is more essential to cultivate than when some dead grass cover has been left; of course, too much dead grass would make it impracticable to renovate.

Where a large area is to be top-dressed it is suggested that portions of the paddocks be renovated, preference being given to such places as valleys or open spaces where little difficulty is likely to be met with from stumps, stones, etc.

Renovating at time of sowing the subterranean clover seed will invariably give a much better germination, with the result that a good stand will be obtained in a year or two less than if the land was not so treated. On open plain country, as is found around Cooma, it is necessary to renovate to ensure a good germination of the clover. On this class of country a renovation prior to sowing, followed by a pasture harrowing immediately afterwards, is desirable for the best results.

(*To be continued.*)

Can Rabbits be Exterminated by Introduced Disease?

IN the annual report of the Institute of Animal Pathology at Cambridge (Eng.), an account is given of Sir Charles J. Martin's work on use of a virus to reduce the numbers of rabbits by introducing an infectious disease deadly to them, but harmless to domestic animals. Using the virus of *Myxomatosis Cuniculi* introduced into colonies of wild rabbits, the disease has proved 100 per cent. fatal. The conclusion is therefore reached that it should not be difficult to exterminate individual colonies of rabbits in this way, but the readiness with which the infection will spread to colonies in the neighbourhood depends on the intercourse between the animals of the different colonies.

A Suggested Rotation for Mudgee-Coonabarabran Wheat Lands.

(*Continued from page 4.*)

A farmer with a tractor unit can handle 500 acres of wheat, approximately one-third of which would be on spring fallow; and 300 acres of oats, half of which would be for grazing. Provided a good stubble burn is obtained, the oats for grazing could probably be sown with one cultivation, using a combine or sunderseeder. If this is done, then the number of cultivations required for growing the oat crop and spring fallowing combined, will be no more (probably less) than if the land was winter fallowed. Moreover, this practice has the added advantage of providing feed during the winter months.

A Rotation for the Small Holding.

For the farmer with a limited holding, who crops a large proportion of the area of his property and consequently is not heavily stocked, the following rotation is suggested:—

1936—Wheat (on fallow) long.
1937—Wheat (on summer fallow).
1938—Oats (for grazing).
1939—Wheat (on spring fallow).
1940—Wheat and lucerne.

This would provide for about 600 acres wheat, half of which would be on spring fallow and 150 acres of oats annually for grazing.

Pure Seed.

Growers Recommended by the Department.

THE Department of Agriculture publishes monthly in the *Agricultural Gazette* a list of growers of pure seed of good quality of various crops in order to encourage those who have been devoting attention to this sphere of work, and to enable farmers to get into direct touch with producers of such seeds.

A grower's name is added to the list only (1) after the crop has been inspected during the growing period by a field officer and favourably reported upon, and (2) after a sample of the seed has been received by the Under-Secretary, Department of Agriculture, Sydney, and has satisfactorily passed a germination test.

Intending purchasers are advised to communicate direct with growers regarding the price for the seeds mentioned hereunder. In the event of purchasers being dissatisfied with seed supplied by growers whose names appear on this list they are requested to report immediately to the Department.

Pure seed growers are required to furnish each month a statement of the quantity of seed on hand. Such statement must reach the Department, Box 36a, G.P.O., Sydney, not later than the 12th of the month.

Maize—	
Fitzroy	Manager, Experiment Farm, Grafton.
Funk's Yellow Dent...	J. A. Martin, Pambula.
	J. A. L. Thompson, " Deep Water," South Gundagai.
Golden Nugget ...	G. J. Smith, " Cainston Park," Wauchope.
	W. R. Mitchell, Lower Towamba, via Eden.
	D. J. Gillespie, Vacy, via Paterson.
Pride of Hawkesbury	H. O. Cox, " Melrose," Barrengarry, Kangaroo Valley.
Golden Beauty ...	W. R. Mitchell, Lower Towamba, via Eden.
Boone County White	A. Chittick, Kangaroo Valley.
Broom Millet	Manager, Experiment Farm, Bathurst.
Tomatoes—	
Australian Earliana ...	E. Kennett, Narellan,
	P. Morandini, " Riviera," Dubbo.
	G. H. Varley, Valla.
	R. Short, Lucknow Road, North Ryde.
Bonny Best	E. Kennett, Narellan.
Break-o'-Day ...	G. H. Varley, Valla.
	E. Kennett, Narellan.
Red Marhio	H. B. Allan, Coff's Harbour.
	E. Kennett, Narellan.
	G. H. Varley, Valla.
Sweet Potatoes (*Cuttings*)—	
Nancy Hall	S. Redgrove, " Sandhill," Branxton.
Yellow Strasburg ...	S. Redgrove, " Sandhill," Branxton.
Southern Queen ...	S. Redgrove, " Sandhill," Branxton.
Farmers' Special ...	S. Redgrove, " Sandhill," Branxton.
Porto Rico	S. Redgrove, " Sandhill," Branxton.
White Maltese ...	S. Redgrove, " Sandhill," Branxton.
Cauliflowers—	
Nugget	John Gardner, Corvallis, via Windsor.
Pumpkin—	
Queensland Blue ...	P. Morandini, " Riviera," Dubbo.
Sudan Grass	Manager, Experiment Farm, Bathurst.
	D. H. Lee, " Baronia," Duri.
	H. R. Tremain, " Rose Farm," Duri.
Sorghum—	
White African ...	Manager, Experiment Farm, Grafton.
Saccaline	A. W. Barry, " Yarrawa," Denman.
Tung Oil Seed (*Aleurites Fordii*)—	
	T. J. Wallant, Wamberal, via Gosford.



Above:

Portion of a Southern Riverina Wheat Crop Badly Infested with Hoary Cress.

Below:

Hoary Cress has Practically Taken Control of this Area in the Southern Riverina.



Hoary Cress.

A Serious Pest of Cultivated Land.

K. G. CARN, H.D.A., Weeds Officer.

HOARY CRESS (*Lepidium draba, L.*) **is an introduced weed from Europe and is common now to most agricultural belts in temperate countries of the world. The term hoary cress originated on account of the slight hoariness, or whitish appearance, of the foliage, due to a covering of very fine hairs. This weed is also known as "white weed" and sometimes as "chalk weed."**

Hoary cress possesses a deep perennial root system, and is rightly considered one of the most serious pests of cultivation land, early identification (as the first step in control) being of utmost importance to the farmers of this State. This weed has already appeared over a wide range in New South Wales, but, with the exception of some districts in the far south, is so far confined to small areas. The rate of spread is slow, but once established it is very difficult to eradicate, even when an intense eradication campaign, employing chemicals, is undertaken in our dry wheat districts.

Very Little Food Value.

The weed is almost entirely useless, and though stock may eat it to some extent, any value it has in this regard is more than offset by the very severe competition to which it subjects other valuable pasture or fodder plants. Hoary cress is a very serious pest of wheat and oat country, causing reduction of yields and subsequent depreciation of land values, and, unless pastures are of a vigorous nature and carefully maintained at that standard, it will also be a serious competitor in the grazing field and cause a considerable reduction in carrying capacity.

Identification.

The flowers are white and easily recognised, but it often happens that the plant does not flower until the second year, by which time the root system has become firmly established in the new situation.

Young plants usually have a "rosette" form, consisting of one or more circles of leaves which arise close to the ground, and these will usually be found connected with

neighbouring plants by horizontal roots of considerable length, from which they arise mostly as buds. Towards early spring the older plants develop an erect stem, which grows to a height of approximately 18 inches and bears alternate leaves about 3 inches long and an inch or more broad. The small crowded white flowers are flat-topped, and can be seen in the crops or pastures from September to November.

Control Measures.

Where hoary cress has spread over large areas complete eradication is not economically possible. The weed, however, can be controlled to a degree, and the farm revenue maintained by the use of such crops as lucerne and other vigorous pastures, provided enough sheep are run to keep seeding at a minimum.

Several excellent examples of control are being demonstrated in this State at present, one being in the south of New South Wales on a wheat farm, and the other in central New South Wales on rich alluvial flats where lucerne hay is the main crop.

Crop Rotation and Grazing.

The property in the south is in the 19-inch rainfall belt, and its 830 acres have been placed under a definite rotation of wheat, oats and fallow (200 acres each) every year, and it carries 350 breeding ewes for the production of fat lambs. The worst areas of hoary cress were sown to lucerne four years ago, and since have been annually top-dressed, renovated and heavily grazed. The cress is still persisting in a small degree, but is not vigorous and not interfering with the lucerne. The owner possesses a sufficiently large plant to delay seeding until rain falls, thus being able to avoid seeding in a dry seed-bed. In this way the hoary cress is prevented from forming the early rosette growth before the wheat germinates. The scheme is a financial success, and the owner now intends to extend the area of temporary pasture and has no fear of the weed under these conditions.

On rich alluvial river flats, vigorous lucerne stands compete without any trouble with hoary cress, but when the stand begins



Hoary Cress Plants in the Rosette Stage. [*Vic. Dept. Agric. Photo.*

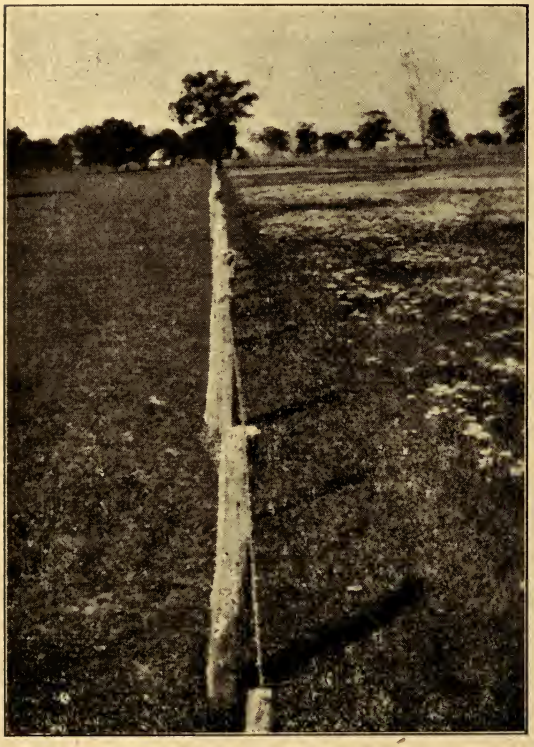


Hoary Cress in the Flowering Stage.

to thin out the cress increases again, and reseeding has to be undertaken after several good cultivations are carried out to reduce the vigour of the cress.

To Deal with Small Patches.

In the case of a small infestation, complete eradication is possible. According to experiments conducted by the Victorian Department of Agriculture, it appears that not less than two years of fortnightly cultivations are necessary to kill the root system.



Controlling Hoary Cress.
Left: Grazed heavily from early stages of growth.
Right: Ungrazed. Note how the stock have kept grazed the strip they were able to reach through the fence.

Salt is generally regarded as the most valuable killer of this plant, and farmers should not hesitate to apply ample salt to isolated plants and small patches.

Carbon bisulphide is very useful where the soil is porous and dry, but it is costly. Quantities of from 1½ to 2 oz. of the liquid are poured into holes bored in the ground to a depth of 18 inches, and 2 feet apart and then sealed up.

Sodium Chlorate.

Where the patches assume any size the most efficient sprays are sodium chlorate and arsenic compounds.

Sodium chlorate is non-poisonous and, provided care is used, will probably be found the more efficient. A double spraying is required, with approximately two to three weeks between each application, using a strength of 1 lb. to 1 gallon for the initial spraying and 1½ or 2 lb. to the gallon for the second spraying.

The most efficient arsenic compound appears to be acid sodium arsenite. A solution is made by mixing 4 lb. white arsenic and 1 lb. caustic soda in 2½ pints water, stirring until dissolved, the spray solution being prepared by mixing 1 part of the stock solution in 100 parts of water, and then adding slowly and with constant stirring 5 parts sulphuric acid. The spray should be applied in hot dry weather and late in the day, and the following morning the area should be re-sprayed with water.

The weed should not be disturbed by cultivation for some time before spraying, and after spraying it should not be cultivated or grazed for some six or eight weeks.

REFERENCES.

Clarke, G. H., B.Sc.—1935: "Important Weeds of South Australia: Hoary Cress." *Journal of Agriculture,* S.A., March, 1935.

Morgan, A., B.Agr.Sc.—1931-1934; (*a*) "Experiments in Hoary Cress Control." *Journal of Agriculture,* Victoria, August-October, 1931. (*b*) "Hoary Cress Control." *Ibid.,* January, 1934.

Hulbert, H. W., Spence, H. L. and Benjamin, L. V.—1934; "Eradication of *Lepidium Draba*." *Journal of American Society of Agronomy,* October, 1934.

SIX months' free practical training and board and lodging are provided at Cowra and New England (Glen Innes) Experiment Farms for lads of 15 years of age and over who are desirous of obtaining experience in farming and grazing. On completion of the course past experience has shown that there is very little difficulty in suitable lads obtaining employment with landholders.

Further particulars are available from the Department, Box 36A, G.P.O., Sydney.

Bird Life not Endangered

By Grasshopper Poisoning.

WHILE it has been claimed by some that bird life is endangered by the laying of poison baits for grasshoppers, systematic investigation of the problem does not support that view. Replying recently to a question asked in Parliament, the Minister for Agriculture (Hon. Hugh Main, M.L.A.) made the following statement:—

Regarding a question asked by the honourable member for Castlereagh concerning the destruction of birds by arsenite of soda and bran bait laid for the poisoning of grasshoppers, I have had prepared a precis of the reports available to the Department on the subject. Mr. J. R. Kinghorn, Ornithologist of the Australian Museum, at the end of 1934 made a special tour of inspection of grasshopper infested districts with a view to investigating the reported killing of birds by arsenite of soda and bran bait. The following extracts from his reports summarise conclusions formed by him as a result of his inquiries:—

> My visit resulted in a modification of my opinion previously based on press reports and hearsay . . . I do not think that bird life is being affected . . . Several persons in the Condobolin district declared that blue martins were being poisoned by the hundred, but the bodies or remains of the birds could not be produced, and a thorough search of baited areas and nearby roosting places as far as 25 miles from Condobolin, failed to produce any dead birds. . . Close observations proved to me that at present they are not attracted by grasshoppers, even where the latter are massed under the trees where the birds are building. . . . During my trip to the south-west and irrigation areas, I did not find any evidence of bird poisoning through the use of arsenite of soda-bran bait used for the destruction of grasshoppers. . . . I am convinced that, under the conditions in which I saw the poisoning no serious effect on the bird life of the State will result.

Special tests have been made in America with a view to determining the effect upon birds of arsenic as used in poisoning grasshoppers, and a publication issued in June, 1934, by the Oklahoma Agricultural and Mechanical College and Agricultural Experiment Station gives full details of the tests made and the results obtained. This report states:—

> Domestic fowls and quail were confined in pens and left without food for twenty-four hours. Poisoned bran was then scattered in the pens at the rate of 100 lb. per acre—

The rate recommended by the New South Wales Department of Agriculture is only 30 lb. to 50 lb. per acre.

> —and the fowls were left another twenty-four hours without other food. No indications of poisoning appeared. From this it was concluded that birds will not be injured through picking up well-scattered poisoned bran. A series of experiments was then conducted in which 144 birds, including chickens, turkeys, ducks, quail and the nestlings of various species of song birds, were fed 17,377 poisoned and unpoisoned grasshoppers. These experiments were continued from ten to sixty-six days. From the experiments, the following conclusions were drawn concerning domestic fowls:—
>
> 1. They readily recognise the fact that poisoned grasshoppers are not as desirable a food as unpoisoned grasshoppers. As a result of this—
> 2. They will eat less than half the number of poisoned grasshoppers that they will of unpoisoned grasshoppers.
> 3. The amount of arsenic consumed through feeding on poisoned grasshoppers averages much less than one-half of a toxic dose.

4. Even though no other food is available for a period of ten days, the fowls will not eat a sufficient number of grasshoppers to obtain a toxic dose.

5. The arsenic obtained through eating the poisoned grasshoppers does not have a cumulative effect even though the fowls were fed for a period of sixty-six days.

6. Feeding on poisoned hoppers does not materially affect the weight or growth of the fowls.

Concerning quail, the following conclusions were drawn:—

1. Even if quail were to eat the maximum number of grasshoppers they have ever been recorded as having eaten, they will not be noticeably injured, though each of the grasshoppers was killed by feeding on poisoned bran.

2. Quail eating the number of grasshoppers normally eaten probably receive only from 1 to 7 per cent. of a toxic dose.

Concerning wild birds, it was concluded—

1. Nesting robins, and presumably other species of a similar size, can consume as many as 134 poisoned grasshoppers containing 39.986 mgs. of As_2O_3 and still mature normally.

2. There is very little danger, if any, to adult wild birds.

Chemical analyses were made of the bodies of a number of chickens that had eaten large numbers of poisoned grasshoppers. These analyses showed definitely that there is no danger of humans being poisoned from eating chickens that have eaten poisoned grasshoppers.

The South African Department of Agriculture has also conducted tests and has issued a bulletin entitled, "Experiments on the Toxicity to Fowls of Arsenite of Soda and Poisoned Locusts." The report concludes by stating:

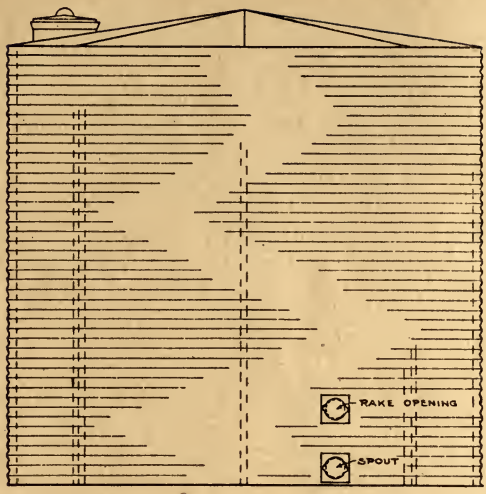
> It would appear that when arsenic is administered in small quantities, such as in sprayed locusts, a domestic fowl can tolerate comparatively large doses over a long period without any visible ill effects. Locusts sprayed at normal strength can be fed to poultry without any danger, as it would appear to be impossible for them to consume sufficient locusts in one day to obtain a lethal dose of arsenic.

I have to-day received a letter from Mr. W. Wheaton, of Balladoran, who states that he has used the poison bait recommended by the Department, and that when using it thousands of wood swallows followed the swarms, nesting in the timber round the house. He hunted all the time he was poisoning, and the only wood swallow he could find dead was months after he stopped poisoning.

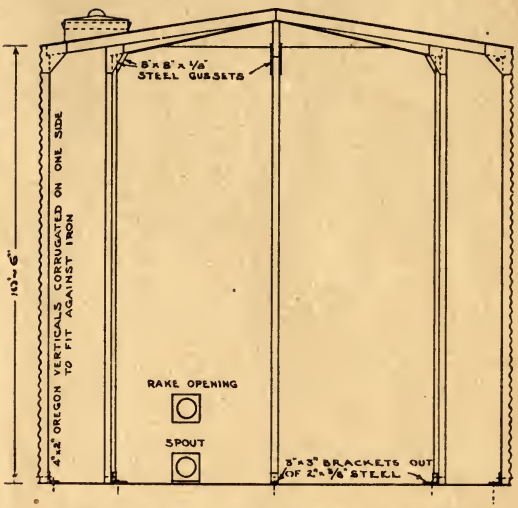
Maize is Excellent for Supplementary Feeding of Sheep.

EVEN in the absence of improved pastures, writes the District Veterinary Officer stationed in the northern section of the State, there is no doubt whatever that sheep can be successfully and economically carried through a rigorous New England winter, provided supplementary feeding is commenced before the stock fall away too much in condition. It is extremely probable (and indeed field tests have already proved) that as small a supplement as 5 ounces of maize per head per week will keep adult dry sheep in good condition. Maize is probably the most economical and efficient supplement for this purpose, and if owners would only adopt some system of storage, such as the use of galvanised iron tanks, and purchase the grain on a low market, the cost of feeding would be much lower than is the case when the feed is purchased during the winter when prices are high.

A rough guide to the amount of storage required to supply 5 ounces per head per week for sixteen weeks to 1,000 sheep would be a 700-gallon tank holding approximately 90 bushels of grain. There are few holdings which do not lose over fifty sheep each winter. Each sheep lost represents a loss of £1 per head at shearing time, and for £1, *i.e.*, the value of each sheep lost, 180 sheep could be fed for one month with certainty of no loss from starvation.



Elevation of Galvanised Iron Grain Silo (960 bus. Capacity.)



Cross Section of 960 bus. Capacity Grain Silo.

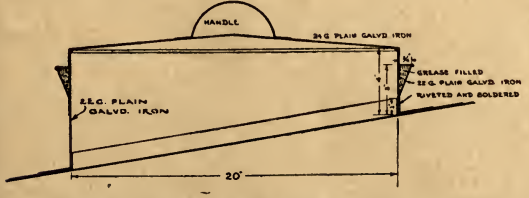
Galvanised Iron Grain Silos.

Constructional Details and Costs.

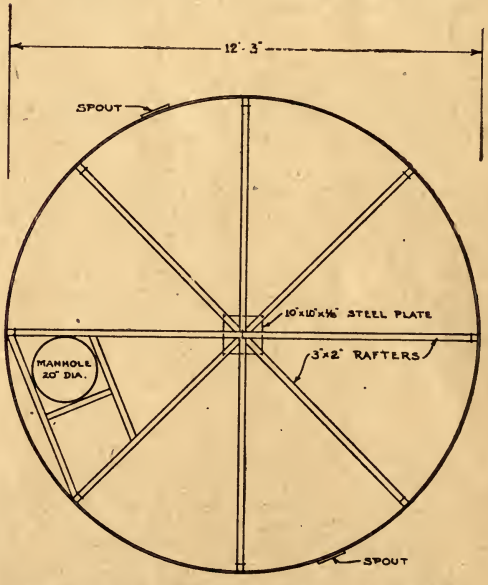
N. L. JONES, A.R.A.I.A., Architect.

THE design of the grain silo illustrated in the accompanying drawings has been drawn up, first as a work which the unskilled man can undertake, and in the second place to provide a structure that will be air- and water-proof—a prime factor in the storage of grain—and strong enough to withstand the internal pressure generated by the grain and external wind pressure when empty.

THESE silos are sometimes set up on a wood decking at bagging height, after the manner of a water tank, and in other cases on a circular concrete floor or slab on the ground, in which case a pit has to be provided for



Details of Manhole of Galvanised Iron Grain Silo.



Plan showing Roof Framing of 960 bus. Grain Silo.

bagging. Another form of stand may be provided by building a complete ring with curved sheets of corrugated iron of 2 inches less diameter than the silo. This ring is well secured at the end laps with ½-inch galvanised roofing bolts and is strengthened at the top with 1-inch angle iron hoop also secured to the ring of corrugated iron with ½-inch bolts. The ring is then filled with sand or loam laid in layers, each layer being well consolidated before the next one is added, and finished slightly higher at the centre than the top of the outside ring. This

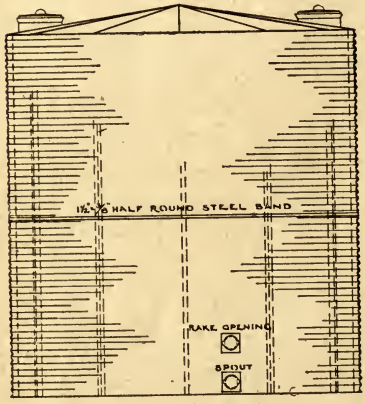
filling is then covered with three-ply bituminous felt or similar material, or even bags well soaked in a suitable proprietary preservative, or painted with linseed oil and cement in the proportion of 14 lb. cement to 1 gallon raw linseed oil.

Ready-made Parts May be Obtained.

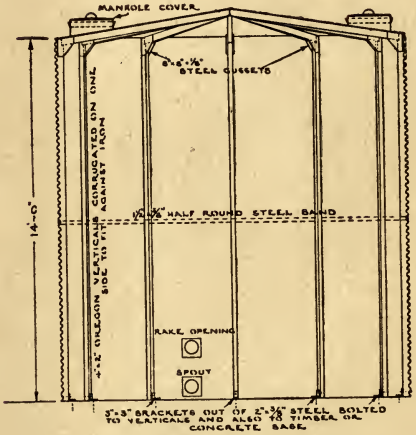
Certain manufacturers are able to supply these silos, in parts, all prepared for assembling on the job. This includes all materials except the roof rafters and the decking or concrete floor on which the silo it set, and spirits of salts for soldering the floor and roof—because of the difficulties involved.

The cylinder of the silo is built up with sheets of curved iron with tarred felt in the joints, and the whole pulled up tight with ¾-inch and ⅝-inch galvanised roof bolts. The floor of the silo is attached when the first ring of the cylinder has been completed, being riveted and soldered after the manner of a water tank, on the making of which a leaflet is obtainable from the Department, with directions covering this work.

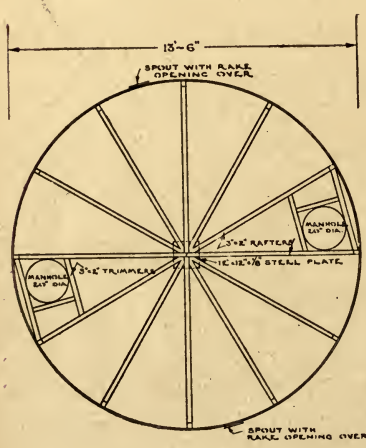
The roof of the silo is put together on the ground in accordance with the diagram and riveted and soldered, and then lifted into position after the vertical studs and rafters have been fixed in position. The vertical studs have a corrugated surface to fit snugly against the iron, and the latter is screwed to the studs from the outside with 1¾-inch galvanised screws and lead washers.



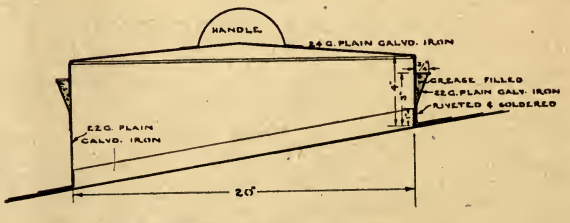
ELEVATION



CROSS SECTION



PLAN SHOWING ROOF FRAMING



DETAILS OF MANHOLE

Details of Galvanised Iron Grain Silo. Storage Capacity, 1500 Bushels.

GRAIN SILOS

Materials for Grain Silos to Specifications and Design by the Department of Agriculture are supplied by;

FOX BROTHERS LIMITED

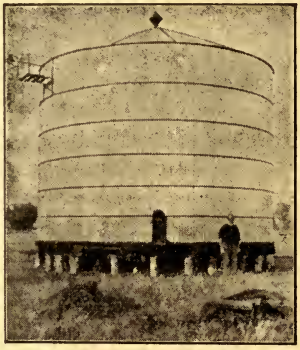
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Printed and Published by and Obtainable from

THE GOVERNMENT PRINTER, Phillip Street, SYDNEY,

or from the

DEPARTMENT OF AGRICULTURE, Box 36A, G.P.O., SYDNEY.

The materials are prepared as far as it is practicable before consignment to ensure accuracy and to save time in assembling. The manhole is already worked in the sheet, with a turned-up edge ready to receive the lid and fitting, and the castings for the bagging and rake openings are corrugated to fit close to the corrugated iron. These are sent out already bolted on.

Costs at Current Prices.

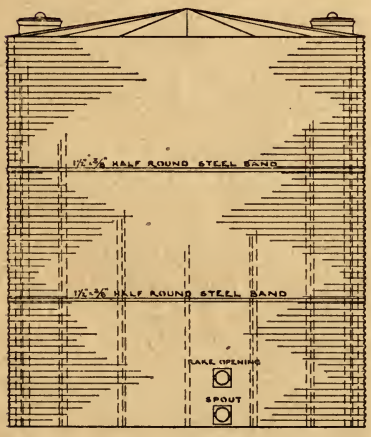
Current prices for the materials for these silos are as follows:—

	£	s.	d.
960 Bushel Silo—			
Cost in Sydney	25	8	0
Freight 300 miles ..	3	19	5
Total	£29	7	5
1,500 Bushel Silo (1 manhole only in roof)—			
Cost in Sydney	42	2	6
Freight 300 miles	5	19	4
Total	£48	1	10
2,000 Bushel Silo (1 manhole only in roof)—			
Cost in Sydney	54	10	6
Freight 300 miles	7	19	9
Total	£62	10	3

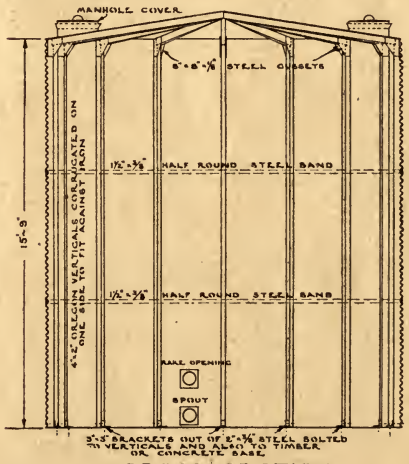
The 1,500 bushel silo has a steel band and the 2,000 bushel silo two steel bands externally for additional strength.

To the foregoing costs must be added the cost of a decking or floor on which to place the silo, and also a platform erected on two poles for filling by pouring grain through the manhole.

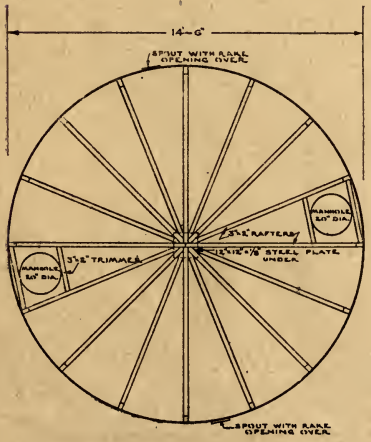
Working plans of these silos are available from the Department, price 2s. 6d. each.



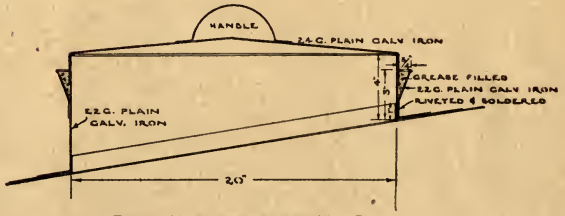
ELEVATION



CROSS SECTION



PLAN SHOWING ROOF FRAMING



DETAILS OF MANHOLE

Construction Details of a 2,000 Bushel Galvanised Iron Grain Silo.

Our Wool Growing Industry

Has Little to Fear From Eastern Competition.

Summary of Report by Dr. I. Clunies Ross.

THE possibility of the East becoming a serious competitor with Australia in wool production has received considerable publicity in recent years. It is well known that of late the Japanese authorities have been interesting themselves in attempts to improve the sheep population of Manchukuo, Korea and Japan, and by this means, among others, to increase the number of sheep carried in these countries.

With a view to making a survey of the sheep and wool industry in the East, Dr. I. Clunies Ross, Officer-in-Charge of The McMaster Animal Health Laboratory, University of Sydney, visited Manchukuo, Korea and Japan early in 1936. His report has now been published by the Council for Scientific and Industrial Research, and the summary of his observations and conclusions is reprinted in the following pages.

IN Manchukuo, Korea and Japan sheep-raising is confined to areas unsuited to agriculture by reason of their low rainfall and severe climatic conditions, and where, in consequence, the pastures are scanty. In the more favoured areas, the demands of intensive agriculture preclude the possibility of sheep-raising on a large scale.

Manchukuo and Inner Mongolia.

So far as the present volume of wool production in Manchukuo and Inner Mongolia is concerned, by far the greater part of this comes from the purely pastoral zones and very little from the agricultural areas. In the border territories between these two zones, there is likely to be increasing competition between the demands of an agricultural and pastoral economy, so that the tendency will be for sheep-grazing to be increasingly restricted in area rather than the reverse. Very definite limitations are placed on the number of sheep maintained by natural grazing owing to peculiarities of climate, both in Inner Mongolia and Manchukuo. The low and highly seasonal distribution of rainfall, the intensely cold dry winter, and the sparse semi-desert nature of the pastures lead inevitably to conditions which do not predispose to heavy carrying capacity even of native sheep. In areas where increased carrying capacity or a combination of agricultural and pastoral practices are attempted, considerable deterioration in the carrying capacity and pasture types or even definite erosion results. It is probable that existing nomadic practices of the Mongol population have led to the maximum safe utilization of this country for pastoral purposes.

INCREASE IN NUMBERS UNLIKELY.

So far then as the basic question of sheep numbers is concerned, it is unlikely that any major increase, even in the number of native sheep, need be expected. It is admitted that some increase might be effected



Pure Bred Mongolian Ram in Manchukuo.
[After Dr. I. Clunies Ross.

where, as in border territories, the farm wastes are used for sheep fodder during winter months, as for example soybean straw. Even under the most primitive conditions, however, the economics of hand feeding in relation to the return per sheep would require serious consideration. Though there is some scope for increased conservation of grass hay in limited areas, on the Mongolian Plateau in Northern Suiyuan and Chahar the sparse nature of the pastures over a large area would create difficulties in effecting this, while similar difficulties would be encountered over a large part of the Barga Plain in North Hsingan.

IMPROVEMENT VERY DIFFICULT.

So far as improved sheep raising is concerned, all the difficulties cited above will operate and to a much more marked degree.



Inbred Second Cross Mongolian Merino Ram, Manchukuo.

[After Dr. I. Clunies Ross.

It has not yet been established that even first cross Merino Mongolian sheep will withstand winter in western, and particularly north-western, Manchukuo, without housing for a large part of the winter and a considerable degree of supplementary feeding. Even should this be possible, it has to be remembered also that the fleeces of these sheep, both in quantity and quality, still possess many of the undesirable characteristics of the native sheep from a manufacturing standpoint. In the case of the second cross and inbred second cross sheep, the general consensus of opinion, with which the experience of the writer concurs, is that they are incapable of surviving under natural grazing conditions and require intensive hand feeding and housing for at least five to six months of the year. The cost of supplementary feeding, whether in border areas or in the purely pastoral areas, as at Hailar, is a serious deterrent to the maintenance of such sheep, while, as has already been mentioned, over a large part of the area involved hay-making with natural grass hay cannot easily be effected. The annual cost of supplementary feed for improved sheep in Kunchuling, Ssupingkai, and Hailar varies from 4s. 6d. to 7s. per head in Australian currency.

DIVERSITY OF WOOL TYPES.

From the standpoint of wool production also, the fact that at best the crossbred sheep alone is likely to be maintained on any economic basis creates great difficulty in the maintenance of any uniform type of wool. The extreme diversity of types which may be expected where breeding and selection of crossbred sheep is not rigorously controlled is too obvious to require further stressing here; it is enough to be reminded that the recent depression in the Chinese wool industry was in part due to the increased competition from the South American crossbred wools in the carpet wool market.

Finally, superimposed on other difficulties inherent in the climate and environmental conditions in Manchukuo and Inner Mongolia, is the difficulty of Mongolian economy to which the native sheep is better suited than the improved variety.

It is concluded, therefore, that there is little evidence of any major increase in sheep breeding throughout Manchukuo and Inner Mongolia, while there is far less prospect of any substantial production of improved sheep and wool being effected in these areas. This does not preclude the possibility of a limited production of improved wool being achieved, even though it be on a quite uneconomic basis.

Korea and Japan.

In relation to improved sheep raising in Korea, wool production on any scale is rendered impossible in the milder areas of the south, firstly, by intense pressure of population and the use of all available country for agriculture, and, secondly, because of the higher rainfall. In the north, there is still the handicap of a relatively dense population, while climatic conditions involving a long dry winter and a short, hot, humid summer render natural grazing extremely difficult and limit it to a short period of only four months. In this area, there can be little question of any extensive production of improved sheep and wool. At most, the maintenance of a small number of sheep for the supply of a woollen homespun industry may be expected, and it has yet to be demonstrated that this is economically sound.

In Japan, the same factors operate as in Korea, the benefit of the milder climate in the former being counteracted by an excessive rainfall, while the method of farm practice is such that, even at high cost, the production of a type of wool which is competitive with that of Australia and New Zealand appears impossible. In both these areas so far from their offering any serious competition to Australian wool-growing interests, the present governmental activities may be considered as definitely favourable, since they are leading to greater appreciation of the value and uses of wool, and later may lead to the development of a taste for mutton. So far as Japan proper is concerned, one cannot help feeling that greater success might be achieved by sacrificing wool quality for a better mutton type sheep and increasing the return per animal in this way.

Wool Consumption in the East.

Since the importance of sheep-raising in Eastern Asia in relation to the Australian sheep and wool industry depends not only on the absolute increase in improved wool effected, but also on fluctuations in wool consumption in these areas during the course of his survey, Dr. Clunies Ross investigated the trend of wool consumption both on the Asiatic mainland and in Japan proper.

His conclusions, as summarised in the report referred to, are reprinted hereunder:

(1) Prospects for increased wool consumption in Japan appear to be bright, there being no evidence that the home market is saturated. Less than 20 per cent. of Japanese woollen manufactures are exported.

(2) Increase in Japanese *per capita* demand to one-third that of Great Britain would necessitate the purchase of a further 250,000 bales annually.

(3) An indication of the faith of Japanese manufacturers in the expansion of woollen markets is the entry, during the past year, of the three largest cotton spinning corporations into the field of woollen manufactures.

(4) There seems every prospect of a rise in woollen consumption in Manchukuo and Korea, which should be reflected not only in an increase in Japanese exports but in Japanese demand for raw wool.

(5) Prospects of continued Japanese purchases in the Australian market appear favourable, and in this connection Australia should realise that this is due not only to the advantage she enjoys in comparison with her competitors from proximity to the Japanese market but also to her highly developed wool-classing and marketing systems.

(6) The principal threat to Australian exports lies not in improved wool production in Mongolia, Manchukuo, or Korea, but in the production of woollen substitutes in Japan, the danger of which is increased by any marked rise in the price of raw material.

(7) The employment of publicity in Japan in regard to the uses of wool and its advantages over artificial fabrics should receive consideration.

(8) There is evidence of a change from the traditional employment of cotton and silk in China to that of wool, such increase at the present time taking the form of a rapid growth of Chinese woollen manufactures, and being reflected in a decrease in the imports of manufactured goods and an increase in that of tops, but not as yet in total value of all woollen imports.

(9) There seems little prospect of an increase in exports of Australian greasy wool to China, the duty on tops being the same as that on raw wool. Since, however, the bulk of tops imported are manufactured from Australian and New Zealand wool, the expansion of Chinese demand is of direct value to Australia.

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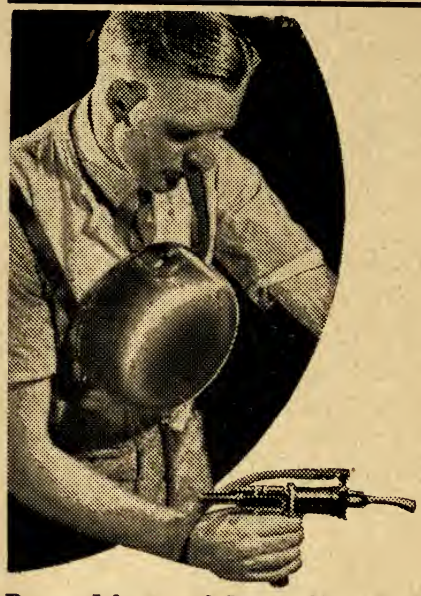
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Sheep Branding and Earmarking.

What the Law Demands.

F. H. HARVEY, Secretary and Registrar of Brands, Stock Branch.*

Every sheepowner is directly concerned with the requirements of the Pastures Protection Act, yet comparatively few are entirely conversant with all that the law requires.

This brief survey by Mr. F. H. Harvey of all that the Act demands as regards branding and earmarking sheep should therefore prove helpful, particularly the sections dealing with travelling sheep, this being an aspect about which there is always a demand for information.

UNTIL 1934 it was required that all sheep above the age of six months should be branded and kept legibly branded with a duly recorded "owner's brand," but with the passing of the amending Pastures Protection Act in that year it became necessary for all sheep of the age mentioned also to be earmarked.

There are special circumstances which should be mentioned in regard to the various requirements for branding and marking.

Brands.

Exemption Till after Shearing.—The 1934 Pastures Protection Act provides that branding may be deferred until after the first shearing where sheep have been earmarked and have not been moved from the holding upon which they were depastured except for the purpose of shearing or crutching at a shearing shed located not more than 12 miles from that holding.

Fire or Colour Brand.—The brand must be either a fire brand or a colour brand, but there is a difference in the size and positions of branding.

Sizes of Brands.—A fire brand must not contain any letter, figure or character less than 1 inch in length, while each letter, figure or character of a colour brand must be at least 3 inches in length.

Positions of Branding.—The positions prescribed for fire brands are either the near side face, front face, off side face, nose or horn. The positions for colour brands are the rump, back, near shoulder, near ribs, off shoulder or off ribs.

To meet legal requirements for branding, whether of sheep or large stock, it is very important that brands shall be affixed in their natural position, as registered. When it is pointed out that the letter "M" becomes "W" when affixed upside down, and the letter "H" becomes a totally different brand when used sideways "H" it will at once be obvious that strict conformity to the registered design is necessary.

Raddle Mark is not a Brand.—A raddle mark is not a brand and may be placed on any portion of a sheep that does not obliterate or deface any registered brand.

Earmarks.

Size of Earmarks.—The size of earmarks is prescribed and varies from a length of ½ inch to 2½ inches, and the width varies from ⅛ inch to ¾ inch, in each case the variation being according to the shape of the earmark.

Shapes of Earmarks.—Earmarks must be of one or more of the shapes prescribed, and 125 shapes have been made available for selection. Such a large number of shapes, singly or in combination, give the sheepowner a wide selection, as about 19,000 different combinations can be made available.

Position of Earmarks.—The position of earmarks is registered by the owner, as being in the front, tip or back of the ear.

The registered earmark must be placed on the right ear of female sheep and left ear of male sheep.

Distinctive Earmarks.—The proprietor of a registered earmark may use a distinctive earmark, to indicate the age or class of his sheep, but such distinctive earmarks must

* Report of an address given by Mr. Harvey to a conference of the Agricultural Bureau.

be of one or more of the shapes prescribed for registered earmarks.

It is not necessary for distinctive earmarks to be registered, and in actual practice a sheep-owner may use his registered earmark as a distinctive mark, provided it is in the opposite ear to that prescribed for the registered mark.

The Sheepman's Ten Commandments.

There are ten offences in regard to brands and marks and each carries a penalty of up to £100.

The law provides that no person shall:—

(*a*) Use his brand or earmark on any sheep of which he is not the owner.

(*b*) Use on any sheep a brand or earmark of which he is not the proprietor.

(*c*) Except as otherwise provided, brand sheep with a brand that is not registered in respect of the holding on which the sheep are branded.

(*d*) Destroy or deface any brand on a sheep.

(*e*) Alter any earmark on a sheep or, except in the case of distinctive earmarks, place any additional earmark on an ear that is already earmarked.

(*f*) Alter any brand on a sheep, either by altering an existing brand or adding another brand otherwise than ordered by the Registrar of Brands.

(*g*) Cut off more than one-fourth of the ear of a sheep.

(*h*) Earmark any sheep with any instrument other than ear-pliers of prescribed type and size.

(*i*) Without reasonable excuse, the proof of which shall lie upon the person accused, have in his possession any sheepskins from which more than one-fourth of either ear has been removed or from which the brand has been obliterated.

(*j*) Contravene any other provision of this part of the Act.

Transfer of Brands and Marks.

Property Rights in Brands and Earmarks.—Only one fire brand, one colour brand and earmark can be registered by each owner for each property he holds, but if two or more holdings are contiguous they shall be deemed one holding for brand and mark purposes.

A brand or mark may be transferred to a subsequent owner or occupier of the holding for which it is registered, or by way of mortgage to a mortgagee, but not otherwise.

On Vacation of a Holding after One Month.—On vacation of a holding after one month, the brand and mark may be cancelled on fourteen days' notice being given.

It is a natural precaution that the same brand or mark shall not be registered for more than one owner in the same district, also that no brand or earmark shall be registered that is likely to be confused with, or could cut out or be cut out by, any other brand or earmark registered for a holding that is adjoining or adjacent. Modification of any existing registered brand or earmark can be ordered by the Registrar of Brands.

Branding Travelling Sheep.

The letter "T" in Roman character cannot be allotted as a brand, being reserved for the branding of travelling sheep.

The part of the Act dealing with travelling sheep contains special provisions in regard to branding with the "T."

In thirty-five out of sixty-three pastures protection districts it is not necessary to brand sheep with the "T" under any circumstances, and in the remaining twenty-eight districts, exemption is provided in the following cases:—

(*a*) If the sheep are lambs under the age of 6 months or have not been shorn for the first time.

(*b*) If the sheep are stud sheep being forwarded to a show or sale or are returning therefrom.

(*c*) If the sheep are consigned to a market or abattoir and are being trucked at a railway station within 12 miles of the property on which they are ordinarily depastured.

(*d*) If the sheep are being taken to a contract shearing shed or dip within 12 miles of the holding on which they are ordinarily depastured for the purpose of being shorn, crutched or dipped, or if they are being returned therefrom.

Concerning Travelling Stock.

The press, on 27th June, 1936, gave prominence to a prosecution by the police, where a man was fined for travelling sheep without a permit or travelling statement. The defendant pleaded that he was under the impression that a permit was not necessary as he was taking the sheep from one property to another of his employer, a distance of 20 miles.

In this he was wrong, as it is necessary for the drover to hold a permit or travelling statement when moving stock. The permit involves payment of the travelling rate, whereas the travelling statement carries exemption from that rate.

Travelling Statement.—In all districts sheep and large stock can be moved on a travelling statement from one run to another of the same owner by the most direct route up to a distance of 12 miles. In the case under notice, the distance being 20 miles, a permit was necessary.

A travelling statement can also be used where large stock are being moved not more than 20 miles within one or more prescribed districts (mostly the coastal districts), or when sheep or large stock are being moved by the most direct route to a contiguous holding.

Unless a district is specially exempted by regulation, a travelling statement cannot be used again in respect of movement of the same stock within one month, and any movement of the stock within that period must be covered by a permit. Twenty-five districts have been exempted.

Renewed Permit and Travelling Charge.—If stock which have reached their destination on a permit are moved again within three months, a renewed permit must be obtained, and in addition to the ordinary travelling rate a travelling charge of 2d. per one hundred sheep or per ten head of large stock must be paid.

The renewed permit provisions do not apply to the case of stock offered for sale at a recognised saleyard if returning to the holding whence they last came, or on removal by a purchaser of any stock which he has purchased at a recognised saleyard, as in these cases an ordinary permit applies.

The renewed permit definitely applies to sales of stock on the roads, or for cases in which there is a change of route.

Discretion in regard to remitting or waiving the travelling charge, as distinct from the travelling rate, is vested in the Pastures Protection Board by which the renewed permit is issued.

It is an offence to drive stock between one hour after sunset and one hour before sunrise without consent from the stock inspector or a Pastures Protection Board director, except that the regulations provide that this restriction shall not apply in the districts of Berrima, Braidwood, Casino, Cooma, Cumberland, Denman, Gloucester, Grafton, Kiama, Maitland, Picton, Singleton and Tweed-Lismore.

In the ordinary course of events, it is necessary to advise the stock inspector, personally, or by telegram or telephone or by post, when travelling stock are about to enter another district, but the regulations provide exemption from this procedure in twenty-four districts (Albury, Bathurst, Berrima, Braidwood, Carcoar, Casino, Corowa, Cumberland, Denman, Goulburn, Grafton, Kiama, Picton, Port Macquarie, Maitland, Molong, Mudgee, Narrandera, Singleton, Tweed-Lismore, Urana, Wagga, Yass and Young).

The prescribed daily rate of travel, reckoned from 6 a.m., is 10 miles for large stock and 6 miles for sheep or large stock which are worked on the journey.

Where the road or route on which the stock are to travel runs through a holding exceeding 500 acres, and is not separated by a stock-proof fence, it is required that the drover will give the occupier from twelve to forty-eight hours' notice before entering, such notice being given either personally or by telephone, telegram, by post, or by leaving it at the homestead or head station.

ACCORDING to the latest annual report of the Institute of Animal Pathology at Cambridge, among the factors which must be taken into account in attempts to control contagious abortion in cattle is the length of time during which *Brucella Abortus* can survive in pastures under natural conditions outside the animal body. An investigation carried out at Cambridge indicates that infected pastures cannot be considered safe until they have been left vacant for a period of at least six months.

Fruit Flies.

Some Common Species in New South Wales.

J. A. WRIGHT, B.Sc.Agr., Assistant Entomologist.

THE Trypetidae, the family of two-winged flies to which the fruit flies belong, includes a large number of species, some of which are important pests of fruits, berries, nuts and vegetables in various parts of the world.

A knowledge of our common fruit flies is of importance in enabling orchardists to distinguish them from the many other flies which may be seen in the trees or caught in fruit fly traps. There is often considerable doubt amongst growers as to the identification of these flies, and this illustrated article has been prepared to enable them to recognise the two pest species and certain others which may be mistaken for them.

THE adult flies of this family are rather handsome insects, some being brightly coloured and others having their wings strikingly mottled or banded. The females are characterised by the possession of a pointed horny ovipositor at the tip of the abdomen, by means of which they are able to pierce (or "sting") the plant tissue and deposit their eggs beneath the surface. The larvae, or maggots, of different Trypetidae are quite varied in their habits. Some live in the leaves, stems or flower-heads of plants, or produce galls, while many live in the fleshy portion of ripening fruits.

Two Important Species.

Of those attacking fruit only two species are of importance to orchardists in New South Wales, viz., the Queensland fruit fly (*Chaetodacus tryoni,* Frogg.) and the Mediterranean fruit fly (*Ceratitis capitata,* Wied.).

Both these species in the larval or maggot stage live in and destroy cultivated fruits, the life history in summer being briefly as follows:—The eggs deposited in the fruit by the female flies hatch in two or three days. The maggots feed in the fruit for about two weeks, and when fully grown pass from the fruit into the soil to a depth of 2 or 3 inches and there change into the pupa or chrysalis. After eleven to fourteen days the adult flies emerge and are soon ready again to lay their eggs in fruit. In cooler weather the times occupied in the various stages may be considerably longer than those stated above.

Control Methods.

The control methods employed against fruit flies are based on the life stages and include (1) the destruction of infested fruit on the trees or ground, with the object of killing the maggots before they can reach the soil and pupate; (2) destruction of adult flies by the use of baited traps in the trees or by applying a poison spray to the foliage.

The Queensland Fruit Fly.

In those areas of New South Wales in which fruit fly is a pest, the Queensland fruit fly (*Chaetodacus tryoni,* Frogg.) (Fig. 1) is mainly responsible for the damage. It attacks summer fruits and also occasionally citrus.

It is slightly larger than a housefly, general reddish-brown in colour and has a somewhat wasp-like appearance. The eyes are reddish-brown, but from certain angles have a greenish-purple iridescence. The reddish-brown thorax has a number of lemon-yellow markings on the sides and upper surface. The triangular scutellum at the tip is of the same yellow colour. The basal portion of the abdomen is light-brown, and the apical portion dark-brown with a lighter transverse band between. The wings are clear with a dark band along the frontal margin and a transverse stripe near the base.

Chaetodacus gurneyi, Perkins.

For many years this species* (Fig. 4) was confused with the Queensland fruit fly (*Chaetodacus tryoni*), which it very closely

* F. A. Perkins: "New Australian Trypetidae with notes on previously described species." *Proc. Roy. Soc.*, Queensland, 1933. Vol. XLV, No. 9, pp. 41–44.



Species of Fruit Flies.

Fig. (1)—The Queensland Fruit Fly (*Chaetodacus tryoni* Frogg). Fig. (2)—The Mediterranean Fruit Fly (*Ceratitis capitata*, Wied); (2A)—head of male. Fig. (3)—The Solanum Fruit Fly (*Chaetodacus dorsalis*, Hendel). Fig. (4)—*Chaetodacus gurneyi*, Perkins. Fig. (5)—*Chaetodacus strigatus*, Perkins—wing. All the files illustrated are females.

resembles. The general colour is similar, but the yellow markings on the thorax do not show up quite so distinctly and the scutellum is mainly brown, but bordered with yellow. The upper surface of the fifth abdominal segment (the last but one as shown in the figure) is characterised by the presence of a large black spot on each side of the middle line. It has been bred from a number of native fruits such as cheesewood (*Acronychia laevis*) lilly pilly (*Eugenia smithii*), wild fig (*Ficus glomerata*), black apple (*Sideroxylon australe*), and white ash (*Schizomeria ovata*).

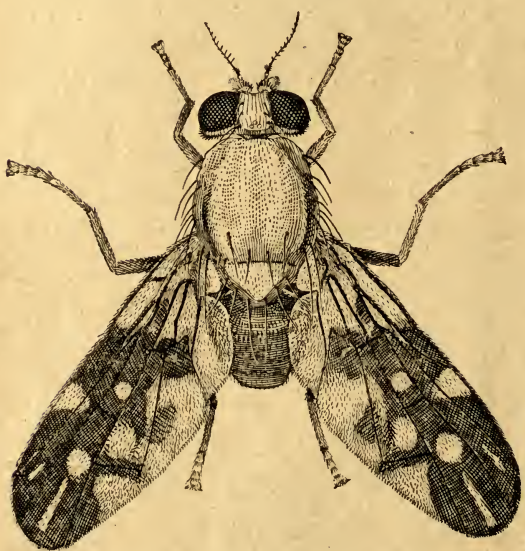


Fig. 6—The Island Fruit Fly (*Rioxa pornia*, Walker). [*After Froggatt.*

Perkins also records *Melodorum leichhardtii* as a host. It has never been bred from orchard fruits, and therefore is not a pest fruit fly.

The Solanum Fruit Fly.

The solanum fruit fly (*Chaetodacus dorsalis*, Hendel) also closely resembles the Queensland fruit fly (*Chaetodacus tryoni*) and has similar lemon yellow marking on the thorax, the triangular scutellum also being yellow. It may, however, be readily distinguished from *C. tryoni* by the black markings on the thorax and abdomen. A narrow black stripe runs down the centre of the thorax, becoming broader as it approaches the scutellum. The marking of the abdomen with a black line down the centre, starting about the middle and extending to the tip, is also characteristic. Its only recorded host plants in New South Wales are *Solanum auriculatum* and *S. verbascifolium* both commonly known as wild tobacco.

Chaetodacus strigatus, Perkins.

Although similar in shape and size to the previous three species, *C. strigatus** (Fig. 5, wing only) differs in its general colour, which is dark-brown. It is devoid of prominent markings except the yellow on the scutellum and other parts of the thorax. Its wings, however, are distinctive among other Australian species of *Chaetodacus* in possessing a transverse brown band near the middle and following the course of the cross veins. No host plants have yet been recorded for this species, and the only specimens obtained have been caught in traps.

The Mediterranean Fruit Fly.

The Mediterranean fruit fly (*Ceratitis capitata*, Wied)—see Figs. 2 and 2A—is quite unlike any of the flies of the genus *Chaetodacus* in general appearance. It is smaller and broader and only about the size of a small housefly. The red eyes have a purplish iridescence. In the male the head bears a characteristic pair of stalked spatulate processes which are not present on the female. The greyish thorax is marbled with glistening black markings producing a pattern as seen in the figure. The hairy yellowish abdomen is prettily marked with two transverse silvery bands. The wings are mottled with yellow and dark-brown markings, as shown in Fig. 2.

Like the Queensland fruit fly the Mediterranean fruit fly will attack summer fruits and also citrus.

The Island Fly.

The body of the island fly (*Rioxa pornia*, Walker)—See Fig. 6—is smaller than that of the Queensland fruit fly. The wings, however, are of relatively large expanse and are strikingly mottled with dark-brown to black markings, with a few clear whitish spots in the dark areas. The thorax is

(*Continued on page* 30.)

*F. A. Perkins: "New Australian Trypetidae with notes on previously described species." *Pro. Roy. Soc.*, Queensland, 1933. Vol. XLV, No. 9, pp. 41-44.

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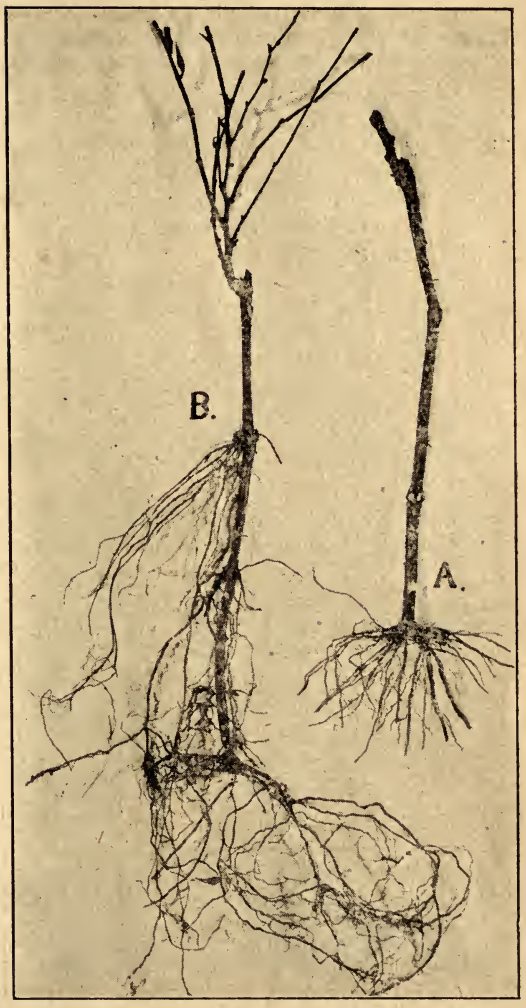
The Planting of Ungrafted Phylloxera Resistant Rootlings.

H. L. MANUEL, Viticultural Expert.

WHERE it is intended to plant a particular area with phylloxera resistant vines, it is necessary, in the first place, to prepare the ground thoroughly by a deep working. Where the ground has been surface ploughed only there is always a likelihood of the roots working towards the surface, particularly in soils which have a more or less stiff subsoil. Not only are the roots cut with subsequent ploughing operations, etc., but in a dry season shallow rooted vines are naturally affected most by the drying out of the surface moisture. After preparatory measures, such as subsoiling, trenching, etc., have been undertaken, the surface should be broken down as much as possible prior to planting, so as to facilitate marking out. The aim should be to make a thorough job of the marking out, so that the rows are perfectly straight from whichever angle the vines may be sighted.

The Planting Operation.

In the actual planting of the vines the most useful tool is a long-handled round shovel with the point either worn down or filed down. A more or less square hole is made in which to plant the young vine, the hole being made a few inches deeper than the length of the vine. In the bottom of the hole a spit of loose earth is placed and the vine inserted with the roots outspread, and on to these roots another spit of earth is placed and well rammed with the feet. The next spit of earth can receive a light ramming, after which the hole should be filled in. The stem of the vine should protrude above the surface of the soil an inch or two.



Showing a Vine as Received from the Nursery (B), and one Pruned Ready for Planting (A).

Prevent Drying Out.

Immediately the vines are received from the nursery they should be heeled in a trench and covered up to the top of the stem with earth, allowing the young wood to protrude. It is necessary to ensure that the young vines do not dry out, and consequently they should not be allowed to remain in the package until planting.

When the time for planting is at hand the vines are removed from the trench in batches, according to the rate of planting, and in most instances pruned of all their roots with the exception of the lower ones,

the latter being cut back so as to leave a length of root about 3 inches, as shown in Fig. A. It will be necessary when removing the other roots to cut close to the stem, otherwise any small pieces left will grow at the expense of the lower ones and will form surface roots. The young growth can be cut back to one spur of a couple of buds.

Fig. B shows how the vines are received from the nursery.

The young vines after pruning should be placed in a bucket about one-third full of water, and in this way they should be carried around for planting. The idea of the water is to keep the roots from drying out.

The young vineyard, after planting, will require to be well cultivated, so as to encourage the young vines to make good growth in readiness for Yema budding the following February.

Selected Citrus Buds.

The Co-operative Bud Selection Society, Ltd.

FOR some years it has been recognised that in most citrus groves there are trees that rarely produce sufficient fruits to be payable, whilst other trees are more constant producers of good quality and payable crops, so that with a view to enabling nurserymen to supply trees of the most productive and remunerative standards to planters, the above Society was formed under the ægis of the Department of Agriculture, and consists of representative fruitgrowers and nurserymen. The Society *does not and cannot make profits*, but merely exists to improve the fruit-growing industry by making available for budding selected buds from special trees of the best type of quality fruit and of reputed good bearing habit only. Trees from such buds should undoubtedly be more profitable and appeal to all progressive orchardists.

The Co-operative Bud Selection Society, Ltd., supplied the following selected buds to nurserymen during the 1935 budding season, trees from which should be available for planting during the 1936 season :—

Nurseryman.	Oranges.		Lemons.		Marsh Grape Fruit.	Total.
	Washington Navel.	Valencia Late.	Eureka.	Lisbon.		
T. Adamson, Ermington	2,000	2,000	2,000		500	6,500
A. T. Eyles, Rydalmere	1,000	1,000	500	500	500	3,500
F. Ferguson and Son, Hurstville ...	1,000	1,000				2,000
H. J. Ferguson, Wyong	250	250				500
R. Hughes, Ermington		500	1,000			1,500
Geo. McKee, Ermington	1,000	1,000				2,000
L. P. Rosen and Son, Carlingford ...	7,000	5,000	5,000	1,000	3,000	21,000
Swane Bros., Ermington	2,000	2,000	1,000		500	5,500
F. E. Spurway, Dundas	2,000	1,000	300	200	200	4,000

Fruit Flies.

(*Continued from page* 28.)

brownish-yellow and the small abdomen is of the same colour, but black at the tip. This fly has been bred from a number of wild and cultivated fruits. It does not appear to attack sound fruit, but only fruit that is already damaged by fruit fly or other insects, or is bruised, cracked or rotted. Therefore it is not considered a primary pest of cultivated fruits, or to cause commercial loss.

Acknowledgment.

Thanks are due to Mr. E. H. Zeck, Assistant Entomologist, for his excellent illustrations.

Contour Planting of Fruit Trees.

A Means of Preventing Serious Soil Erosion.

(*Concluded from page* 700 vol. 47.)

J. A. BALLANTYNE, Orchardist, Bathurst Experiment Farm.

THOUGH a certain amount of sheet erosion of soil is unavoidable in orchards on hilly country, the laying-out of orchards on the contour system will definitely eliminate all serious soil erosion. This is the opinion of Mr. Ballantyne after some years of experience of the system.

In December issue he discussed the pros and cons of contour planting, and the methods by which the orchardist may decide whether the method is suitable for his property. The present article discusses the procedure once a decision has been made to plant on the contour system.

WE now have two lines of pegs on the area, the contour and the wire at right-angles to it, as shown in Diagram 1 (*see* page 699). Along the row at right-angles (the wire), fill in the intermediate spaces with pegs, each one the distance apart the rows are to be. This row of pegs will act as a check, from which, at any later period in the marking out, if desired, a true contour can be run across the area.

Measure a Few Rows.

Number one row of trees is represented by the contour row remaining (A B in Diagram 1). Using a tape or stick, and, working right along No. 1 contour, peg out the second contour (see Fig. below), which, of course, is to be the second row of trees. On completion of pegging, these two rows will be parallel. Then, according to the judgment of the orchardist, one or more rows can be run out in a similar manner, measuring and pegging the third row from the second row, the fourth row from the third row, and so on. Following the measuring and lining up of each contour row, it is a good plan to inspect it, and if by a little movement of the pegs here and there a better curved row will result, make the necessary alterations, since 12 or 15 inches difference in the width of the rows makes little difference in the working of the orchard.



Measuring Out Subsequent Rows, After Plotting the First Row with the "Level."

And Then Make a Test.

It is advisable at this juncture to make a test to ensure that the last row measured has a fall in the right direction, and if so, that the fall is not excessive. If it is found that one or more portions of the line are low, or the fall excessive at either end, it may be necessary to discard one or more of the proposed planting lines, and then by a little judicious manouvering—perhaps a shortening of one row by cutting off, introducing a short row, etc.—the difficulty can be overcome. It will be found in practice that there are usually several ways of overcoming the difficulties which are certain to arise. Diagrams 3, 4 and 5 illustrate a few methods which can be utilised to increase or decrease the fall of the contours, in the middle and at either end of the rows.

Diagram 3 demonstrates an area where on completion of the taping or measuring

of the third row (C) it was found that at one end of this row the fall was excessive on the line C to D. By cutting off the portion marked C to D, and extending the contour C at the point D to the row below at B the fall is greatly reduced. The centre row would, of course, be cut off at X, so that the appearance of the three contour rows completed would be as seen in Diagram 4.

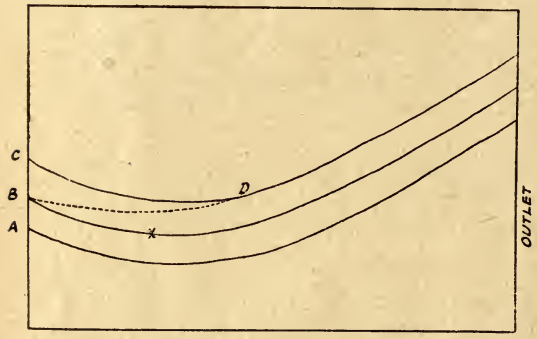


Diagram 3—Method of Overcoming the Difficulty of Too Great a Fall at the End of a Measured Planting Line.

In a similar manner adjustment may be made should it be found that the fall was not sufficient at the latter end of the contour C in Diagram 3, though correct at the top end; by a similar movement at this end the fall can be increased considerably.

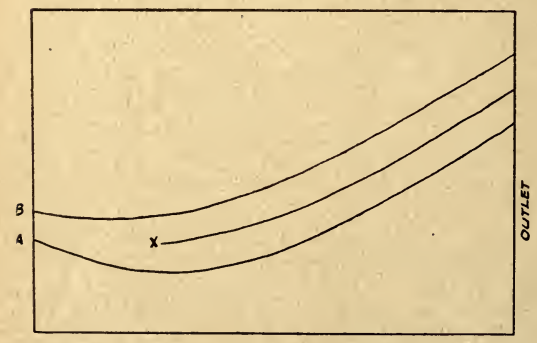


Diagram 4—Planting Lines After Adjustment of the Problem Presented in Diagram 3.

In Diagram 5 the fall in the contour C was quite satisfactory to the point marked D, but from D to X the fall was found to be in the wrong direction, although quite all right from the point X to the end of the line. By running the contour C from the point D to join the contour B at the point E, the difficulty could be overcome. The second contour row B will, of course, be a short one ending at F, and the centre portion of the original contour C (D X) will be discarded. The fourth row will now be measured from, and parallel to, row C, D, E, H, as shown in Diagram 6.

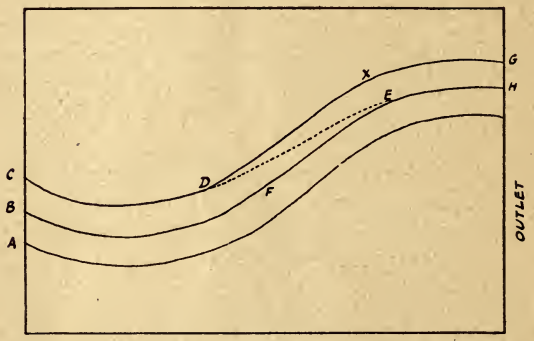


Diagram 5—Method of Overcoming the Difficulty of a Fall in the Wrong Direction in the Centre of a Measured Planting Line.

How to Test the Planting Lines.

There are several ways of testing the taped or measured contour rows to find out if they have the correct directional fall and are within the limit of the recommended slope—up to 3 per cent. An easy method is to utilise the contour board for the purpose, but first it is necessary to screw on to the short leg, a piece of wood corresponding to the original piece cut off. Where the contour board was made with a 1¼ per cent. fall, the short leg would have to be extended 2½ inches. Now place

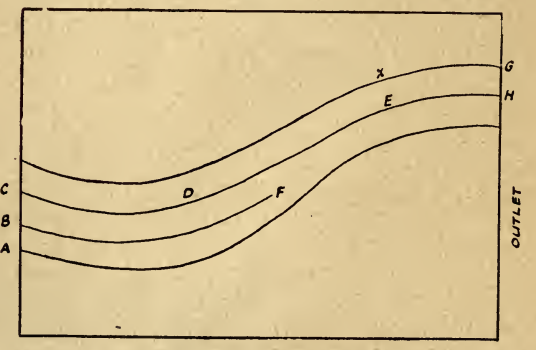


Diagram 6—Planting Lines After Adjustment of the Difficulty Illustrated in Diagram 5.

the board in a level position (so that the bubble is in the centre of the spirit level) and place a 6-inch block of wood under one leg. Now mark the position of the bubble on the spirit level; this is the position of the bubble when a 3 per cent. fall has been obtained. In regard to the minimum fall of ½ per cent. it can be considered satisfactory if the bubble shows any movement in the right direction, provided it does not exceed the mark denoting 3 per cent. fall for any great distance. When using the board care must be taken to see that it is pointing in the right direction at all times, *i.e.*, with the end under which the 6-inch block of wood was placed pointing up the hill.

how far from the true contour the existing rows are. If this true contour line is running fairly parallel to the last-measured line, it will probably be quite satisfactory to discard the true contour, and carry on with the tape as before. If, on the other hand, the true contour has little in common with the last measured line it may be advisable to have a division in the block and peg out the succeeding rows, using this true contour as the base line.

Proceed in a similar manner until the whole area has been contour-lined and pegged.

On completion of the contour row pegging, it is advisable to check up each individual row, this being done simply by



Two-year-old Apple Trees Planted on the Contour System.

Following the testing of a contoured row, and if required, the making of the necessary alterations to ensure that the fall and direction are suitable, continue as before, from the latest or altered row with a tape or stick, and peg out further rows until it is considered advisable to make a further test.

Check With a Line Contour.

When ten or twelve rows have been pegged out in this manner it is a good plan to run out a true contour, using the contour board for the purpose. Starting from the line at right-angles to the contours, work the contour board in both directions right across the area. It can now be readily seen

eyesight. It will probably be found that perhaps one or two rows are showing sharp bends, and by moving a few pegs up or down, a much better line will result. Contrary to general opinion, a difference of 12 or 15 inches between the rows of trees will make little difference in the subsequent working of the orchard.

To Mark Out the Orchard.

Having pegged out and completed all the contour rows, it will be found advantageous if their positions can be suitably marked and the majority of the pegs removed. The contour rows could be furrowed out by means of a Planet Junior, but if a good teamster is available a single-furrow plough

is the most suitable implement, and has the added advantage that should heavy rains fall in the meantime the outline of the furrow will remain. In ploughing the contours discard all the pegs by ploughing through them, except those in the original line at right-angles to the contours. At both

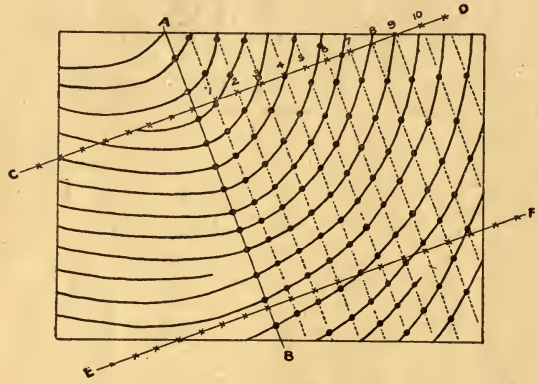


Diagram 7—Showing the Method of Marking Out in Rows on the Contour in One Direction, and Parallel on the Other.

ends or at convenient places on this remaining line, it will now be necessary to run two lines right across the area, at right-angles to the row of pegs, and, of course, parallel to each other. The 3, 4, 5 unit method is best used for setting out the right angles (*see* Diagram 7). Measuring from the row of pegs proceed to mark out along these lines, the distance apart it is intended the trees will be in the rows. At this stage the planter must decide whether the distance between the trees can remain stationary, or if it would be advisable to increase or decrease this distance slightly in accordance with the curves in the contours. It will be found that the greater the curves the greater the variation of tree distance in the rows, and consequently the fluctuation in the number of trees per acre (*see* Diagram 7). It can be seen from this diagram that the distance apart of the trees in the contour rows is gradually increasing towards the ends of the contours, and the only manner in which this can be rectified or reduced is by decreasing the distance between the pegs at the ends of the two base lines.

In Diagram 7 the line A-B is the original line at right-angles to the contours. The lines C-D and E-F are at right-angles to A-B. The dots represent the position of the trees in the rows. It can readily be seen that unless the distance between the pegs (shown as X) in the lines C-D and E-F are reduced towards the outer ends, the distance between the trees will be too great, resulting in a dimunition of the number of trees per acre. It is suggested that if the intended distance between the rows be 22 feet, in the area represented by Diagram 7, this measurement should be gradually reduced, beginning from about row five, where the distance would perhaps be 20 feet, and so on, until the distance between the rows at the ends would only be 16 feet.

To complete marking out of the orchard, either sight in or stretch a wire from corresponding pegs of the two parallel base lines. By inserting a peg exactly where the wire line crosses the contour furrows, the pegs will be placed on the contour in one direction and parallel to each other in the



Furrowing Out the Contour Lines, After Completion of Pegging and Checking.

opposite direction. When planted, of course, the orchard can be quite easily worked in both directions, although it will be advisable, as far as possible, only to work the block in the direction of the contours.

(*Continued on page* 58.)

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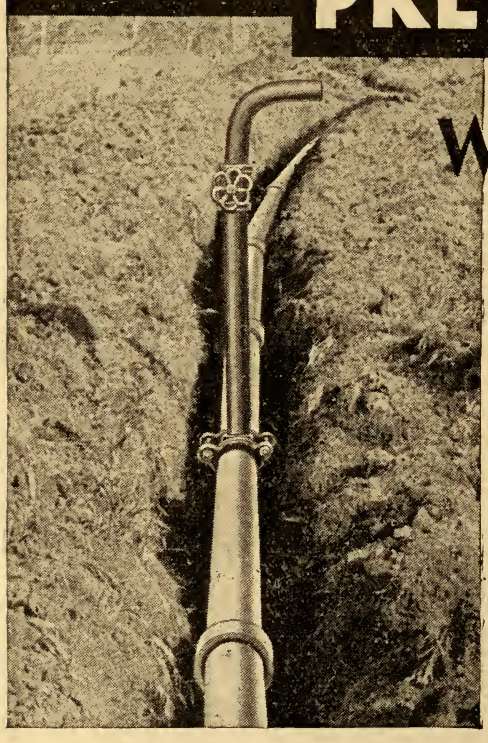
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January in the Orchard.

C. G. SAVAGE and W. LE GAY BRERETON.

Cultivation.

DURING the busy period of harvesting, the welfare of the trees which are carrying a crop, but more particularly those which have already carried a crop, is very liable to be overlooked. In the case of the former, soil moisture is one of the most important factors in bringing the fruit to satisfactory maturity. In the latter case, though the trees have yielded their crop, soil moisture is equally important for the formation of fruit buds and the building-up of reserves for the following season. Therefore precautions should be taken to prevent unnecessary loss of soil moisture. This applies especially to localities where rainfall solely is relied upon to supply this requirement.



No Weeds in this Orchard.

Destroy Weeds.

In many districts the rainfall has been far short of requirements, consequently there has been practically no weed growth since the spring and the soil is in a loose condition. In such cases nothing further can be done, but where weeds have sprung up and the soil has become compacted, the former must be destroyed and the soil brought into proper tilth.

The best means of effecting this depends on circumstances. If the weeds are not too large, and the land has not crusted too deeply, possibly this can be done most economically with an efficient orchard cultivator, but in other cases a light ploughing will be necessary. Then, again, if it is intended to sow a green manure crop the following month, it is also advisable to plough.

It might be repeated here that the Department recommends the plough as the best "cultivator," and the several reasons for this are fully explained in the leaflet, "Orchard Cultivation," obtainable free of charge from the Department of Agriculture, Box 36A, G.P.O., Sydney.

There is no doubt that the ploughing-in of leguminous green crops has a very bene-

ficial effect on orchard soils, mainly because such a practice assists in maintaining the humus content.

Unfortunately, there are conditions which limit the carrying out of green manuring in orchards. In localities where the normal rainfall is only sufficient to produce crops of fruit, and where water for irrigation is not available, it is extremely risky to grow any competing crop among the trees, even during the winter months, except in years of abnormally high rainfall. And even in localities of high rainfall, or where irrigation is practised, one cannot be certain of growing a heavy green crop for ploughing-in every season.

Sow Early.

The sowing of green crops should be carried out early (February, and early March) so as to obtain as much growth as possible before the winter. In all circumstances the ploughing under of such crops should be completed by the end of July.

At one time field peas was the standard green manure crop in our coastal districts, but in recent years this crop has failed because of disease, and lupins and purple vetch have proved more satisfactory.

Where irrigation can be practised in our inland districts, tick beans have proved very satisfactory, but field peas or purple vetch is more reliable where soil moisture is limited.

In some cases, when a change is being made from one leguminous crop to another, the new crop may not do its best the first season, owing to the absence, or scarcity, of its associated bacteria in the soil, but in subsequent years when the necessary bacteria multiply the crop thrives.

These crops should be sown with from ½ to 1 cwt. superphosphate, or a mixture of superphosphate and blood and bone, per acre.

Re-soiling and Summer Training.

In citrus areas the bulk of harvesting is completed, and provided the condition of the soil permits, now is an opportune time to undertake the job of re-soiling.

On hillside orchards, some provision should be made to check washaways before re-soiling is carried out.

Many of our deciduous trees make a lot of growth early in the new year, and, although young trees may have had attention early in the season, they may need further attention now.

Leading shoots which are outstripping their neighbours, or which will not be required for the formation of the tree, may need checking by pinching or slashing back the growing points. Care must be taken to cut where the growth is still soft; if cut where the wood has hardened, the shoot will sometimes fail to start again and will always remain stunted. When young trees are growing very rapidly it is sometimes necessary to treat all the leaders as described above, in order to prevent their being blown out or blown all to one side by strong winds. When the leaders are checked it is also necessary to check the strong laterals in a similar manner.

Use Caution When Thinning.

Strong growths that occur in places where they will not be required, and which, if allowed to remain, may sap useful leaders, should be removed altogether. Great care should be taken, however, that the removal of superfluous growths is not overdone during the growing season. It should be remembered that the raw sap must be elaborated by the foliage before it can nourish any part of the tree, hence the progress of the tree will be retarded by too severe thinning during the growing period. Moreover, superfluous strong growths (those that will not be required for the future framework of the tree) are often beneficial in other ways; for instance, with trees of upright habit, if the centre is occupied by superfluous strong shoots during the growing period, the outside desirable strong shoots will grow more to the outside, and thus secure a more open framework. In fact, the practice of cutting to the bud above the desired bud when topping young upright trees is really taking advantage of this habit of growth. If the tree is over-thinned during the growing period, the desired shoots that are left are too exposed, and many will be broken by heavy winds.

Trees that have been re-formed by budding or grafting within the last year or two will require treatment similar to the young trees.

Prune Drying.

To obtain a good quality dried prune it must be fully ripe, and the only way to ensure this is to allow the prunes to fall from the tree. If an attempt is made to pick them from the tree it is certain that immature fruit will be gathered and a mixed inferior quality dried product will result.

As it is necessary to let the fruit fall, the ground beneath the trees should be "smoothed" to facilitate picking up. Smoothing can be done with harrows or a rake. This is about the only instance in which a smooth and fine soil surface is advocated in the orchard.

When prunes are approaching the ripening period there is most often a premature drop. This fruit is immature and should be discarded as it will not make a saleable article. As the mature fruit starts to fall it must be promptly and regularly picked up.

Towards the end of a crop it will be found that mature prunes will hang on the trees and at the final clean-up it is necessary to shake the trees or pick the last of the fruit from the tree. It is only at this time, when all the fruit is mature, that this practice is permissible.

The Dipping Solution.

Having gathered the ripe fruit, a quantity of water is placed in a vessel of any convenient dimensions to a depth of not less than 18 inches. Caustic soda is then added to the water, and the whole brought to the boil. The percentage of caustic required for the desired purpose varies from 1 lb. of caustic soda in 12 gallons water to 1 lb. in 30 gallons. The water should be kept boiling, and the prunes placed in a ¼-inch mesh wire basket, known as a dipping basket, or a well perforated dipping bucket.



A Rough Surface Mulch Has Many Advantages.

The cultivated strip under the trees shows a fine surface soil mulch. The rougher mulch, as shown on the right, is preferred, as it allows the rain to soak in with little or no run-off, and it is not so readily broken down by rains as a finer mulch.

Robe de Sargent, the earlier ripening prune, has a tender skin and very quickly spoils if left lying in the hot sun, and, consequently should be picked up daily. The d'Agen variety has a tougher skin and will not spoil so quickly, and provided the land is dry, "picking up" of this variety can be done every second day. Though in cool weather d'Agen prunes can be allowed to remain longer without appreciable harm, it is unwise to do so as there is always danger of rain, which may cause a heavy loss.

It is impossible to state any fixed proportion for the solution—the correct strength can only be arrived at by testing. This should be done by placing a few typical prunes in the dipping basket, and immersing them for periods of from one to five seconds. It is preferable that the dipping should be as momentary as possible. If, therefore, it takes five seconds to bring about the desired amount of cracking, it

would be better to add a little more caustic soda so as to reduce the period of immersion. If the solution is too strong it will split the fruit, which is most undesirable. If the solution is not strong enough it will have no effect on the exterior of the fruit, but if the solution is of the correct strength the fruit, after being exposed to the air for a few seconds, should show a slight cracking of the skin on some of the fruit.

The Dipping.

Having arrived at the correct strength of the solution, dipping may proceed. It is preferable to immerse the fruit right to the bottom of the receptacle, then draw the dip bucket or basket along the length of the dip as it is quickly brought to the surface. The fruit should then be immediately placed on wooden trays or on the drying racks, upon which hessian has been spread, and allowed to dry. Do not expose freshly-dipped fruit to the hot rays of the sun. If it is a very bright day the trays should be stacked, and, if the weather continues hot and bright, they should remain in stacks for three or four days before being exposed to the rays of the sun. The period of drying, of course, is influenced by the condition of the weather.

It will be found that the smaller fruit will have dried sufficiently before the larger. The trays should therefore be looked over and fruit sufficiently dry should be removed. It should be removed from the trays when it feels tough, but will not exude any juice when rolled and squeezed. If cut, the correctly dried prune will show a meaty condition right to the pit, but with no free juice. Testing of the prune for dryness can only be done when it has cooled off in the evening or before it has warmed up in the morning.

Bush Fires in Banana Plantations.

MANY plantations throughout the banana districts have been ravaged by bush fires during the past few months, and the losses sustained by individual growers varied from very slight to extremely heavy damage.

Growers affected will have to decide on the methods they will adopt to re-establish their plantations. Aged areas which were weak and declining in growth had better be destroyed if seriously damaged, as the results likely to be obtained from persevering with this class of plantation will in all probablity be disappointing. Younger plantations and older areas which were growing strongly and in good condition before being burnt should be cut down to ground level. Numerous suckers will then appear, and when they are about a foot high two or three of the most vigorous spear-head types of varying sizes should be chosen to re-form the stool. All the suckers not required should be destroyed, and as they persistently appear for some weeks afterwards it becomes necessary to remove regularly the superfluous ones.

The suckers which appear after a fire are abnormal and somewhat deceiving in their growth, and at times mistakes will occur in selecting the correct type of plant to keep. A fair proportion of the suckers will be water-suckers, or weak and spindly plants, as all the forward and dormant eyes are forced into growth by the effects of the fire. In plantations where the fire has only scorched the stools it is likely that any plants two or three months from bunching will throw from six to ten new leaves before the bunch appears. The plants will then have sufficient leaf growth to develop and mature the bunch, and the fruit should consequently not be effected to any extent in these cases.

The severity of the fire and the age and condition of the damaged plantation have a considerable bearing on the best methods to adopt to re-establish them.

The Bunchy Top Position.

During the past two years an acute depression has existed in the banana industry, and mainly owing to this fact growers have found it most difficult to give proper attention to their plantations, the result being that bunchy top disease has increased considerably. When prices for fruit improved last April growers, generally, responded by taking a keener interest in their areas, and since then they have given more attention to their plantations.

Besides being helped by improved prices the growers' own organisation has assisted them in the control of bunchy top by engaging men to find and treat diseased stools in their plantations. While apparently satisfactory results have been achieved in this respect, it should not be forgotten that the extremely dry season being experienced has operated against the spread of bunchy top, and there is likely to be a recrudescence of the disease following a good fall of rain.

A similar season to the present one was experienced in 1928, and while the disease was not particularly bad in the districts where most bananas were grown at that time, it quickly spread and assumed control after the wet season commenced.

The importance of early detection and thorough treatment and destruction of diseased stools cannot be stressed too strongly. —H. W. EASTWOOD, Senior Fruit Instructor.

Currant Drying.

W. McCUTCHEON, H.D.A., Fruit Instructor, Curlwaa.

THE sugar content of the currant grape should be relatively high and the Baume reading of the must (or "juice") should, if practicable, be not under 13½ degrees (preferably higher) at the commencement of picking. On many farms, however, this degree of maturity is not generally reached by the time picking must be commenced. Several factors determine the best time to pick, chief among which is the avoidance of rainfall and consequent loss by splitting and mould. Furthermore, the berries in many areas, because of the extremely vigorous growth continuing into the autumn months, do not develop a high sugar content until very late in the season. In these localities, however, the absence of a high Baume reading is generally compensated for by the extra heavy crops, although the berries are frequently of a comparatively low grade.

"Tipping" or "Slashing" the Vine.

The practice of "tipping" the vigorous shoots of the currant vine is sound on the more vigorous soil types, provided the operation is carried out at the proper period, which generally begins early in November and ends during the first week in December.

About Christmas in each year the fruit begins to develop sugar and to commence colouring and any reduction of the leaf area after early December will result in a lowering of the sugar content, or, at the very least, in retarding the development of the sugars. There is also the increased risk of unfavourable weather before harvesting.

By "tipping" is meant the removal from the growing shoot of the terminal tip, only the immature tip of 2 to 3 inches, and not the mature leaves or wood, being removed.

There is a very prevalent idea that when the fruit has commenced colouring the canes bearing the bunches can be slashed off just above the bunch and that as a result the currant berries will blacken off in colour. Observation of this practice over a period on various soils and under various conditions has not shown it to be by any means satisfactory, and it may be regarded as an attempt by the grower to compensate for faulty practices earlier in the season (pruning and irrigation). The stripping of the leaves from the canes, in order to expose the bunches to the light, has also been done at times, but this is not only expensive, but is inefficient and cannot be recommended.

Time of Picking.

The actual time and even the degree of maturity at which picking will commence is very varied even in the same district. To quote an example, in the Curlwaa Irrigation Area there is a section of land of a heavy texture which is regularly ready to harvest during the last week in January, and within a very short distance are currants which even in March are not properly mature. The latter are on a lighter soil of the "silt" type and the Baume reading of fruit grown on this class of land generally at 1st March does not exceed 12½ to 13 degrees, whilst on the heavy land Baume readings of 14 to 16 degrees are to be obtained a full month earlier.

As a consequence of this late maturity and the absence of the desired black colour and the overseas demand for a light-coloured sultana, quite a number of growers of both sultanas and currants now harvest some or all of their sultanas first. In this way the light-coloured sultana is obtained (certainly at the cost of weight), and by reason of the fact that the sultana will dry quicker than the currant by a number of days the racks are available for the second filling at an earlier date. Another advantage is the longer period allowed on the vine for the currant and consequent deepening of the colour and increase in the weight of the dried product.

The disadvantages of this method lie in the loss of fruit by reason of over-maturity on the vine, with part drying of the more exposed berries, which may drop off the bunch as the vine moves in the wind. Rain also will lead to severe damage of the ripening currants, causing splitting of the berries with exudation of juice and generally resulting in the development of bunch mould.

Picking and Spreading on the Rack.

When the maximum practicable degree of development and maturity has been reached the fruit is ready for picking. It is impossible to lay down any hard-and-fast rule as to when the fruit is mature and ready to pick, which can best be judged by the individual after due consideration of the circumstances.

A very common fault in spreading currants on the rack is putting on too much fruit, also uneven distribution of the fruit, resulting in the formation of "puddings"—heaps of fruit in one part with wasted space elsewhere. These "puddings" are generally associated with the tipping of the buckets of fruit direct on to the rack and too hasty and imperfect spreading of the resultant heaps. The use of the spreading trays is recommended just as strongly for currants as for sultanas.

As the filling of the racks progresses the side curtains should be let down, or the verandahs, if such are used, should be set in position as soon as convenient. Shade dried currants are preferred to those dried in the open sun, as they carry a better bloom and are generally a little better coloured. The racks should therefore be roofed and the side curtains should be in place to shade the fruit. In the event of wet weather, however, there is very often a risk, if the unfavourable weather conditions continue for any length of time, that mould will develop in the fruit on the racks, and to prevent or check this the racks of fruit should be opened up after rain to permit the freest possible movement of air amongst the fruit until such time as the surface of the fruit has again become thoroughly dry.

Removal from Rack.

It is preferable that the fruit should remain on the rack until almost dry enough for delivery to the packing house. It is not implied that the "bucks" (or "boys") should be at this stage of dryness; these will probably be semi-dried only, but before delivery can be made to a packing house drying of these must be completed, and the simplest method of obtaining this effect quickly is to expose the fruit to sunlight on hessian for a day or more as may be necessary, rolling the fruit into puddings or bundles each night when the fruit is still warm but not hot, as if fruit is too hot sweating and massing may take place.

When the fruit is quite dry it may be boxed, and in all or almost all cases an improvement in quality can be made by storing (sweating) the fruit in boxes for a period of two to six weeks if possible.

So far the practice of spraying currants on the rack seems to be of limited and doubtful value, as none of the sprays used have even the slightest value in the control of mould; in fact, spraying can do definite injury if the fruit to which it is applied is still moist. Spraying can only be regarded as an aid to drying, and as such is of doubtful value for currants. There is no substitute for proper protection from inclement weather. Rack verandahs, properly constructed and hinged, afford a most efficient protection from rain, and yet permit of a free movement of air right through the rack. The side curtains of hessian are neither so efficient in the protection afforded against rain, nor do they, when in position, allow of the maximum air movement through the fruit during and after rain falls.

Insect Pests and Their Control.

Notes Contributed by Officers of the Entomological Branch.

Citrus Scale Insects (*Coccidae*).

IN the coastal area of New South Wales a number of different species of scale insects infest citrus trees, the commonest being white wax scale, white louse, purple scale, red scale, and brown scale. These may occur either as single infestations, or else several species may be present on the one tree. Control measures applied for one scale may not be satisfactory for the other species present, though where citrus mites are also to be considered, the spray programme may be modified to control mites and certain scale pests in the one operation.

Fumigation where practicable is to be preferred to spraying for scale insect control.



Citrus White Wax Scale.

White Wax Scale and Citrus Mites.

In those districts where citrus mites are troublesome it is usually found that an early hatch of white wax scale also occurs, larval emergence being practically complete before the end of December.

Lime-sulphur 1 in 40 applied thoroughly about mid-December, using a suitable spreader, has been found to give an excellent control of both mites and wax scale, the control being dependent largely on the thoroughness of application. Two such applications at a fortnight's interval are suggested.

This programme will also serve to check purple scale for a time, but should be followed in late February with an oil spray at 1 in 40. If wax scale is not under complete control, soda should be added to the oil.

Experiments over the last three years have shown a double oil programme to be the most satisfactory method of control where purple scale infestation is severe. This consists of an application of white oil 1 in 40 in late November, followed by a similar spray in late February. This schedule has also been found to give excellent control of citrus mites, and, where the hatch of wax scale is early, to assist in the control of this pest. Where wax scale infestation is heavy it may be found possible to apply the first oil spray in early December with better results against wax scale, and with little loss of efficiency against purple scale. In any case the addition of 8 to 10 lb. washing soda to 40 gallons in the February oil spray will control the remaining wax scale.

Purple Scale and White Louse Scale.

This is a commonly occurring combination, and may be dealt with by either of the last two spray programmes, viz.: (1)

Lime-sulphur 1 in 40 about mid-December followed by oil 1 in 40 in late February; and (2) oil 1 in 40 in late November followed by a similar spray in late February.

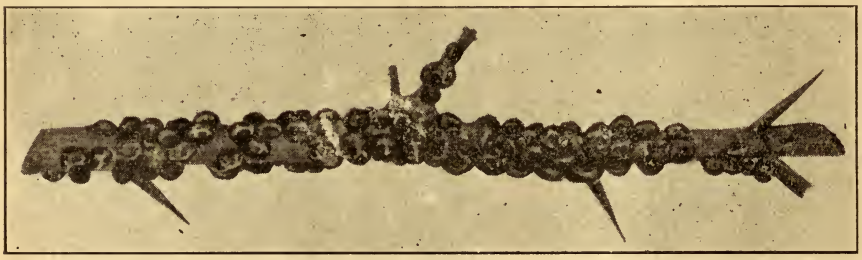
Though either of these programmes gives complete control of white louse scale, the lime-sulphur followed by the oil is the better of the two. Usually, however, it is better to treat white louse scale as a separate pest and to apply a more concentrated lime-sulphur solution to the insides of the trees about May. If the infestation is likely to become serious, it may be dealt with by using lime-sulphur—1 in 10 to 1 in 15, depending upon the strength of the lime-sulphur—on the insides of the trees and then applying the 1 in 40 solution of lime-sulphur over the outsides of the trees in November and December as already indicated.

Brown Scale and White Wax Scale.

This combination of scale is usually confined to a few trees in an orchard, but occasionally may form a general infestation, sometimes accompanied by red scale. In the coastal areas brown scale passes through more than one generation a year, and it is sometimes difficult to find a majority of the scales present in a suitable stage for treatment. However, it will generally be found present in the immature stages during December and early January, when the trees should be sprayed with either red or white oil at the rate of 1 in 40. If the hatch of white wax scale is early and even, good control of this pest may also be obtained by a late December spraying with oil. Light infestation of red scale will probably be held in check by such early spraying, but where the infestation is heavy it will be essential to apply a later spray of oil about March.

White Wax Scale.

This may be treated as indicated in the spray programmes suggested above, or else may be controlled by the addition of soda to the general scale spray of oil applied in February or March. The amount of soda required will be dependent upon the stage in development of the wax scales—about 8 lb. washing soda to 40 gallons being required when the wax is in the "peak" stages, usually about mid-February, and up to 15 lb. fresh washing soda to 40 gallons when the scale is well developed in late March.



The Brown Scale.

Success in controlling this scale is dependent largely upon obtaining thorough coverage. Rain following a few hours after spraying may completely nullify the effects of soda spray. Where oil is not required for control of other scales the soda may be applied alone, but a spreader such as soap or oil should preferably be used. Red oil is most satisfactory for this purpose and may be used at the rate of 1 gallon to 80 gallons of spray.

Notes on the Purple Scale (*Lepidosaphes beckii*).

The purple or Mussel scale of citrus is common in the Gosford district where it is probably the most serious scale pest. It is often confused with female white louse, to which it bears some resemblance. The adult female purple scale is very similar in shape to some grass seeds and is often known to growers as "grass seed" or "carraway seed" scale.

It infests the wood, leaves, twigs and fruit and may cause very severe injury to the tree when the infestation is heavy. It occurs principally in moist protected situa-

tions and prefers dense well-grown trees. Although it may be present on lemons it is rarely of importance and is generally worse on oranges and grapefruit. The presence of this scale makes the fruit very unsightly.



The Purple Scale

The life history, briefly, is as follows:—

In the winter the scale is usually in the adult condition, and during this period eggs are developed and laid. Hatching occurs in the spring from September onwards with the peak hatch during November. These scales become adult and deposit eggs during December and January, and young larvae appear in numbers in late January and through February, March and April. The maximum hatch in this brood appears to be in late February and early March. Three or more generations may be produced in a year, but two main broods occur.

Very little direct fruit surface infestation takes place until the end of summer, the spring brood larvae infesting the leaves and twigs and settling beneath the calyx lobes of the fruit. In February the progeny from these scales, beneath the calyx, swarm down over the surface of the fruit and settle at the contact points between two fruits or else where leaf and fruit touch each other.

The period of development from the time of emergence as a larva until that individual lays eggs is about sixty days. These eggs take about twenty days to incubate and larvae appear about eighty days after the birth of the parent. The average number of eggs produced per female is 150.

For the control of this pest see the earlier recommendations in these notes.

The Tomato Mite (*Phyllocoptes lycopersici*).

Owing to the unusually dry conditions in the spring and early summer it is anticipated that tomato mite infestation will be severe in mid-season and late crops, unless control measures are adopted.

The mites are extremely small, and only become visible on the foliage under magnification. Consequently, their presence in crops is frequently overlooked, although they may be causing serious damage. Hundreds of these very small, yellow mites may occur to the square inch of foliage. Their presence shortens the productive life of the



crop very considerably. They feed on the surface tissues of the stems, the fruit and the foliage, reducing the vigour of the plants and causing shedding of blossoms and stunting of the fruit. Usually severe infestation does not show up before the first two or three trusses of fruit have matured, although occasionally plants are affected earlier and the whole crop is lost.

Symptoms of Attack.

The first sign of infestation is a silvering of the foliage and a drooping and curling of the lower leaves. The stems and leaf stalks also have a smooth appearance due to destruction of the epidermal hairs by the mites. Later the stems and under-surfaces of the leaves become dirty brown in colour, and the skin of the fruit sometimes has a roughened, corky appearance. In the final stages of infestation the leaves wither and die and the plants become defoliated, except for fresh green shoots which appear at the top and base of the plant.

Infestation is not usually severe in districts where only spring or autumn crops are grown, but where planting extends over several months of the spring and summer, or of the summer and autumn, the later plantings are usually heavily infested.

Control.

Treatment for tomato mite should not be delayed until the symptoms of damage appear, as by that time the plants will have suffered a severe setback and some loss of crop will result. In localities where the mite frequently occurs, treatment to prevent infestation should be a routine measure.

Seedbeds should be treated, and after transplanting, the crop should receive at least two treatments, the first when the fruit commences to ripen and the second a month later.

The cheapest and most effective method for control is spraying with lime-sulphur 1 in 100, but where Bordeaux mixture for disease control is used, lime-sulphur spray is inadvisable as some foliage injury will result. Where Bordeaux mixture has been applied, wettable sulphur, 1 lb. to 12 gallons may be used, or the plants may be dusted with equal parts of sulphur and lime.

Two Minor Pests.

The Walnut Leaf-Mite—(*Eriophyes tristriatus*).

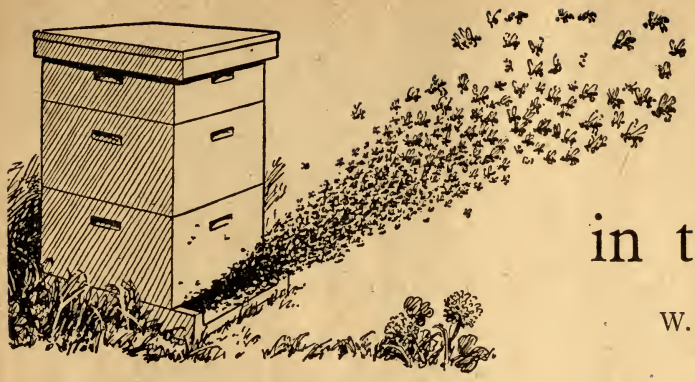
Recently at Batlow Mr. S. L. Allman, Assistant Entomologist, observed leaves of walnut trees showing infestation by the walnut leaf-mite, *Eriophyes tristriatus* Nalepa.



These mites are invisible to the unaided eye, but their feeding produces large blister-like swellings on the upper surfaces of the leaves and yellow or brown felty pads on the undersides.

They are known to occur in Europe, America, New Zealand and Tasmania, but this is the first record of their occurrence in New South Wales. This mite is considered to be of little economic importance.

(*Continued on page* 52.)



Seasonal Work in the Apiary.

W. A. GOODACRE,
Senior Apiary Instructor.

WHERE drought conditions and bush fires have been experienced, it will be necessary to keep a close watch on the food supply in the hive. Stores of honey have been used up of late, and should the bees be left in danger of facing starvation, they will, as a matter of economy, cut down brood rearing to such extent that serious colony losses may occur. Many apiarists in districts now experiencing adverse conditions have reserves of low-grade honey from the previous good seasons, which they are now finding useful for feeding back to the bees. This is an excellent practice, provided, of course, the apiary from which the low-grade honey was obtained was free of brood disease. It is best to feed sugar syrup where there is any doubt on this score.

In extreme cases, where there is no early autumn prospect, the bees should be moved to a more promising locality.

During adverse times every care should be taken to minimise the risk of unduly exciting the bees by allowing robber bees to gain access to honey. The bees should be fed inside the hive, the feeders being filled indoors and then placed carefully in a previously prepared position in the hive. Supply the food late in the afternoon so that it will be cleaned up overnight. The quantity given at the commencement should be fairly large in order to put the colony well ahead, and then some stimulative feeding once or twice a week should carry the bees along and keep them in good heart.

A few prominent beekeepers, principally queen rearing men, practise outdoor feeding, using a large container with ample float accommodation, which is placed some distance from the apiary. Very thin syrup is used and the colonies are given small supplies at first, these being gradually increased until the bees become accustomed to accepting an adequate quantity daily without undue excitement. Beginners, however, had better not attempt this plan, and in any case, where other beekeepers are established in the vicinity their bees also help themselves to the supply.



Painting the Hive.

Improved Conditions in Some Districts.

Conditions for bees are now more progressive generally on the lower south coast and parts of the central tablelands. Beekeepers in the "yellow box" country out west which is heavily stocked are again reminded to observe carefully the pollen supply available for their bees, and, should a shortage occur which affects brood rearing, to try out the substitutes mentioned in last month's "notes."

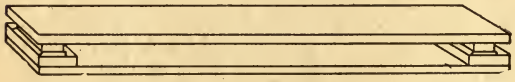
Some "yellow box" honey is being extracted and a few beekeepers persist in taking it before a fair surface of the combs is capped. This "box" honey shows fair density, even when it is a little on the green side, but these men are losing the benefit of the final and im-

portant work of the bee "chemists," with the result that this extra choice line of honey is reduced in excellence. Buyers seeking particularly choice grades can detect anything wanting. They demand a sample which is well processed by both bees and beekeeper.

Control of Ants.

In some inland districts ants are causing trouble. The small black ant and the mound ant are the worst offenders. In the Department's leaflet, "Ants and their Control," the following recommendations are made:—

The small black ant and sugar ant may be controlled by the use of poison baits, the following formula being recommended:—Boil together, slowly, for 30 minutes, sugar 1 lb., water 9/10 pint, tartaric acid (crystalised) ¾ gramme; allow



A Colbourne Ant-proof Hive Stand.

to cool; loss of water by evaporation should be made up. Dissolve 2 grammes of sodium arsenite (80 per cent. arsenious oxide) in 1/10 pint of hot water; allow to cool and pour into the sugar solution previously made, stirring well. Add 2½ oz. honey and mix thoroughly.

Another ant bait prepared as follows may be used:—Boil together slowly for 15 minutes, sugar 1 lb., borax ¼ oz., water 1 pint; allow to cool. Dissolve 1/16 oz. arsenite of soda (80 per cent. arsenious oxide) in 2 fluid oz. of hot water; allow to cool and pour into the sugar solution, stirring well. Add 1 oz of honey and mix thoroughly.

The bait should be set out in small tins (such as tobacco tins), the sides of which should be provided with openings for the entry of the ants, the lids being closed. A small piece of cloth or other substance placed within the tin will provide additional foothold for the ants. Place the baited tins in the tracks of the ants, preferably outside the house.

Both the above baits are poisonous and care must be exercised in handling them.

Mound ants may be controlled by the use of carbon bisulphide, potassium cyanide, or calcium cyanide dust. If carbon bisulphide is used, 1 or 2 oz. of this liquid should be poured down each main opening of the nest and the openings covered over with moist earth or wet bagging. The gas given off being heavier than air penetrates downward into the galleries of the nest and kills the colony. Carbon bisulphide is very *inflammable and explosive,* and lights of any kind must be kept away from it.

Potassium cyanide is used at the rate of 4 oz. dissolved in a gallon of water, a pint of the poisoned water being poured down each opening to the nest. *Cyanide water is an extremely deadly poison, as also are the fumes given off by it.* Calcium cyanide dust, which gives off hydrocyanic acid gas on exposure to air, is blown into the holes in small quantities with an insect-powder blower. *This gas is also extremely deadly.* After applying either potassium cyanide or calcium cyanide it is advisable to cover over the entrances to the nests.

Carbon bisulphide, potassium cyanide, and calcium cyanide should all be kept well out of the reach of irresponsible persons.

A simple plan preferred by many beekeepers to poison mound ants is to pour a small quantity of powdered sheep dip down many of the nest entrances.

In some parts where there is a real plague of ants it is advisable to procure ant-proof hive stands. The small trays attached to the stands, when filled with tattoo oil or a mixture of coal tar and kerosene, are very



A Roadside Honey Stall.

effective, provided the ground about the hives is kept clear of grass. This type of stand (see illustration) is used with satisfactory results at the Cowra Experiment Farm apiary.

High Hive Stands Not Recommended.

It is surprising the number of beekeepers who work their hives on high stands, the top supers being about head high. It is very difficult to manipulate these hives, and, moreover, when extracting, many young bees get on to the ground and fail to return to the hive.

It is preferable to have low stands about a flat brick high, and keep the ground about the hives clear of grass. It is easier to

manipulate the hives and during extracting operations the bees may be shaken from the combs on to the ground to return to the hive by way of a short, conveniently placed right-of-way.

Advertise Honey.

A great deal has been done of late to popularise honey in Sydney and as a result summer sales have considerably improved. Country beekeepers would do well to use every endeavour to further honey sales in their respective districts.

The Department is making available shortly an illustrated leaflet dealing with the use of honey in the home kitchen. This will embody a number of recipes for cakes, etc., by Mrs. Graham Smith. The leaflet will be issued free on application.

Painting Established Hives.

Bee hives may be painted whilst the bees are in occupation. If the front of the hive towards the hive entrance is carefully painted first, the smell of the paint has the same effect as smoke in keeping the bees quiet.

Paint should not be allowed to drip on to the projecting part of the bottom board, nor should this portion be painted, for wet paint here would considerably inconvenience the field force.

A coat of paint applied every year or so brightens up the appearance of the apiary and preserves the hive material by preventing warping and development of cracks in the timber. Some beekeepers prefer to purchase a supply of ready-mixed paint, but the majority make up their requirements from white lead, raw oil, and turpentine as a drier.

Time should be available for carrying out such useful improvement this season, and the cost of painting is by no means expensive when compared with its value.

Agricultural Societies' Shows.

SECRETARIES are invited to forward for insertion in this list dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Box 36A, G.P.O., Sydney, not later than the 15th of the month previous to issue. Alterations of dates should be notified at once.

	1937.
Kiama	Jan. 8, 9
Dapto (H. H. Beattie)	„ 15, 16
Albion Park	„ 22, 23
Wollongong (A. O. MacGillycuddy)	„ 28, 29, 30
Castle Hill (E. V. Jackson)	Feb. 5, 6
Berry	„ 5, 6
Guyra	„ 9, 10
Gosford (T. S. MacDonald)	„ 10, 11
Nowra	„ 11, 12, 13
Kulnura (L. Lundie-Jenkins)	„ 12
Tenterfield	„ 16, 18
Kangaroo Valley	„ 17, 18
Moruya (A. H. Preddey)	„ 17, 18
Gunning	„ 18, 20
Wyong (F. Akhurst)	„ 19, 20
Lithgow (E. Dobbs)	„ 19, 20
Robertson	„ 19, 20
Taralga	„ 23, 24
Yass	„ 23, 24
Coonabarabran	„ 23, 24
Bowral	„ 23, 24
Inverell (E. A. Clarke)	„ 23, 24, 25
Newcastle (P. G. Legoe)	„ 24 to 27
Moss Vale	„ 25, 26, 27
Binnaway	„ 26
Queanbeyan	„ 26, 27
Milton	„ 26, 27
Rydal (A. E. Lemon)	„ 26, 27
Mendooran	Mar. 1
Tumut (T. E. Wilkinson)	„ 2, 3
Braidwood	„ 2, 3
Braidwood (R. L. Irwin)	„ 2, 3
Bombala (M. E. Stewart)	„ 3, 4
Gulgong	„ 3, 4
Maitland	„ 3, 6
Oberon (F. J. Gibbs)	„ 4, 5
Crookwell	„ 4, 6
Manilla	„ 5, 6
Campbelltown	„ 5, 6
Picton	„ 5, 6
Tumbarumba (L. O. Lees)	„ 9, 10
Tamworth	„ 9, 11
Armidale (A. McArthur)	„ 9, 10, 11
Cooma (G. E. Metcalfe)	„ 10, 11
Mudgee (J. Y. Rheinberger)	„ 10, 11
Camden	„ 11, 13
Goulburn	Mar. 11, 13
Taree	„ 11, 13
Blayney (S. Dyson)	„ 12, 13
Dunedoo	„ 17
Muswellbrook (R. C. Sawkins)	„ 17, 18, 19
Orange	April 13, 15
Narrabri (J. McL. Davis)	„ 14, 15
Grafton (Len. C. Lawson)	„ 14 to 17
Dungog	„ 15, 17
Moree	„ 21, 23
Luddenham (A. A. Fawcett)	„ 16, 17
Kempsey (E. E. Mitchell)	„ 21 to 24
Gresford (A. R. Brown)	„ 23, 24
Casino (E. J. Pollock)	„ 27, 28, 29
Bellingen (J. F. Reynolds)	„ 29, 30
Trangie (F. H. Hayles)	May 11, 12
Cootamundra Sheep Show	July 3, 4, 5
Peak Hill (W. R. L. Crush)	„ 27, 28
Tullamore (W. J. Colville)	Aug. 3, 4
Trundle (D. Leighton)	„ 10, 11
Condobolin (J. M. Cooney)	„ 17, 18
Weethalle	„ 18
Lake Cargelligo	„ 24, 25
Grenfell	„ 24, 25
Bogan Gate (J. T. a'Beckett)	„ 25
Parkes (L. S. Seaborn)	Aug. 30, 31, Sept. 1.
Young	Aug. 31, Sept. 1, 2
Ungarie	Sept. 1
Forbes (W. D. Roberts)	„ 7, 8
West Wyalong	„ 7, 8
Murrumburrah	„ 7, 8
Burrowa	„ 9, 10
Cowra	„ 14, 15
Barmedman	„ 15
Canowindra	„ 21, 22
Temora	„ 21, 22, 23
Ardlethan	„ 25
Barellan	„ 29
Quandialla	„ 29
Griffith	Oct. 5, 6
Bribbaree	„ 6
Leeton (E. C. Tweedie)	„ 12, 13
Ariah Park	„ 13
Cootamundra	„ 19, 20

Tubercle-free Herds.

THE following herds have been declared free of tuberculosis in accordance with the requirements of the scheme of certifying herds tubercle-free, and, unless otherwise declared, this certification remains in force until the date shown in respect of each herd :—

Owner and Address.	Number tested.	Expiry Date.
		1937.
W. Newcomb, " Minnamurra," Inverell ...	85	6 Jan.
Stace Bros., Taylor Street, Armidale ...	20	13 "
Wagga Experiment Farm (Jerseys)	74	13 "
Wollongbar Experiment Farm, Lismore (Guernseys)	118	14 "
J. Lowrey, Gum Flat Road, Inverell ...	68	15 "
Lunacy Department, Morisset Mental Hospital	58	15 "
Wm. Thwaites, " Lansdowne," Inverell ...	51	16 "
Navua Ltd., Grose Wold, via Richmond (Jerseys)	58	16 "
F. L. McGufficke, Eastbourne, Inverell ...	95	18 "
St. Patrick's College, Goulburn	9	18 "
George Rose, Aylmerton	4	19 "
Robt. Ferguson, 52 Allenby Road, Orange...	10	23 "
W. W. Martin, " Narooma," Urana Road, Wagga	139	26 "
Grafton Experiment Farm	190	24 "
Farm Home for Boys, Mittagong	54	29 "
H. R. Provins, " Happy Valley," Inverell ...	21	30 "
R. C. Dixson, Elwatan, Castle Hill (Jerseys)	23	12 Feb.
Government Agricultural Training Farm, Scheyville	159	6 March.
G. W. Scholes, " Overton, "Muswellbrook...	181	16 "
Lunacy Department, Rydalmere Mental Hospital	60	22 "
Kahlua Pastoral Company, " Kahlua," Coolac	88	27 "
Lunacy Department, Gladesville Mental Hospital	32	27 "
Lunacy Department, Kenmore Mental Hospital	95	30 May.
Australasian Missionary College, Cooranbong	17	2 June.
The William Thompson Masonic School, Baulkham Hills	48	5 "
Lidcombe State Hospital and Home ...	173	5 "
G. T. Colless, Park Road, Enfield	57	15 "
A. A. McTaggart, " Arizona," Muswellbrook	47	15 "
E. D. Hordern, " Karmsley Hills," Cowpasture Road, Cabramatta	103	16 "
K. W. D. Humphries, " Karoola," Muswellbrook	219	19 "
Prison Farm, Emu Plains	16	24 "
Puen Buen Ltd., Scone (Jerseys)	219	25 July.
F. R. M. Cross, " Emoh Ruo," Wybong Road, Muswellbrook	23	9 Aug.
C. M. & W. E. Chaffey, Somerset House, Tamworth	62	1937. 30 "
A. L. Logue, " Thornbro," Muswellbrook ...	59	16 Sept.
Department of Education, Gosford Farm Homes	17	3 Oct.
H. H. Hinton, Hoibrook	15	15 "
Dr. H. V. Hordern, Parklands, Berry ...	62	28 "
Lunacy Department, Callan Park Mental Hospital	31	29 "
W. S. Turnbull, Flanders Avenue, Muswellbrook	47	12 Nov.
Limond Bros. Morisset	51	15 "
C. Wilton, Bligh St., Muswellbrook	78	3 Dec.
Forster & Sons, Abington, Armidale (Jerseys)	57	5 "
N. L. Forster, Abington, Armidale (Aberdeen Angus)	187	5 "
Berry Training Farm, Berry	175	19 "
Department of Education, Brush Farm, Eastwood	10	1938. 6 Jan.
Miss N. C. Brennan, Arrankamp, Bowral ...	7	12 "
Newington State Hospital and Home ...	99	12 "
Department of Education, Yanco Agricultural High School	57	22 Feb.
Riverina Welfare Farm, Yanco	96	22 "
Cowra Experiment Farm	23	23 April.
New England Experiment Farm, Glen Innes (Jerseys)	35	25 "
Bathurst Experiment Farm (Ayrshires) ...	25	18 May.
Hurlstone Agricultural High School, Glenfield	56	3 Aug.
Hawkesbury Agricultural College, Richmond (Jerseys)	114	10 "
G. Goodchild, " Calala," Tamworth	65	2 Sept.
New England Girls' Grammar School, Armidale	24	18 "
H. F. White, Bald Blair, Guyra (Aberdeen Angus)	339	22 Oct.
Koyong School, Moss Vale	4	4 Nov.
Tudor House School, Moss Vale	24	4 "
E. L. Killen, Pine Park, Mumbil	59	8 "
James Dray, Kayuga Road, Muswellbrook...	13	11 "
Lunacy Department, Parramatta Mental Hospital	18	7 Dec.
Wolaroi College, Orange	19	7 "
Liverpool State Hospital and Home... ...	100	10 "
State Penitentiary, Long Bay	9	15 "

Tubercle-free Areas.

The following Areas have been declared tubercle-free and no cattle are allowed to be kept therein unless subjected to the tuberculin test and found free from tuberculosis :—

Bombala Area.
Inverell Area.
Municipality of Muswellbrook.
Municipality of Queanbeyan.

—MAX HENRY, Chief Veterinary Surgeon.

Infectious Diseases Reported in November.

The following outbreaks of the more important infectious diseases were reported during the month of November, 1936 :—

Anthrax	10
Blackleg	7
Piroplasmosis (Tick fever)	Nil
Pleuro-pneumonia contagiosa	Nil
Swine fever...	Nil
Contagious pneumonia	7
Necrotic enteritis	Nil

—MAX HENRY, Chief Veterinary Surgeon.

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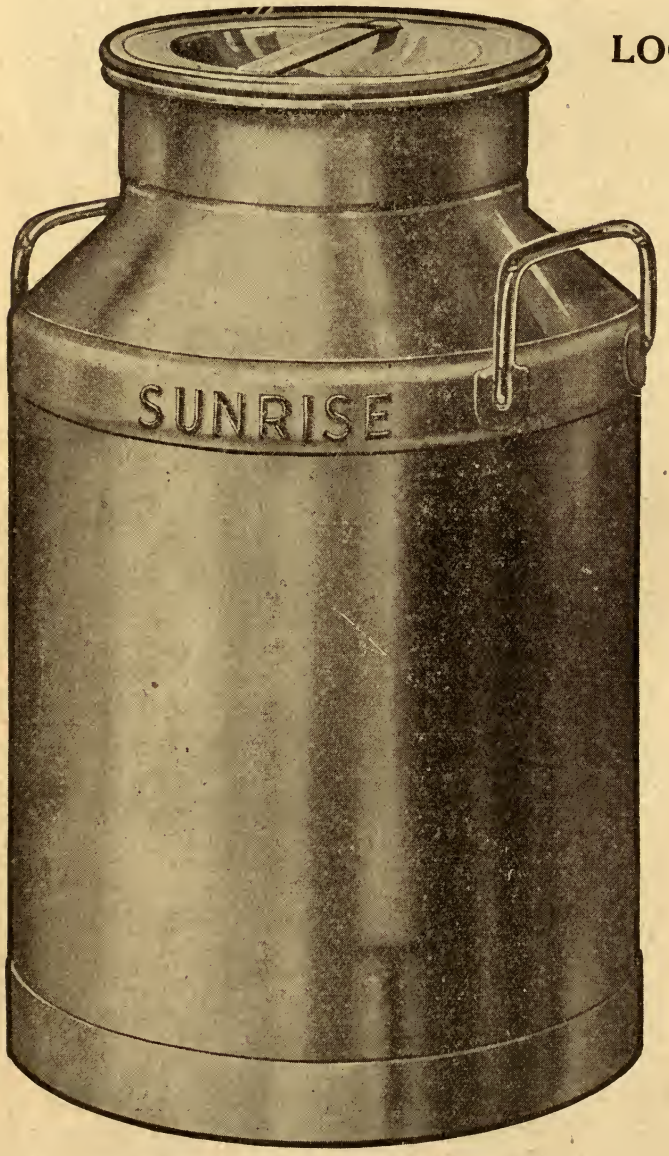
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Sugarcane as Green Fodder.

Promising Results on Illawarra Dairy Farm.

LARGE quantities of green fodders are grown by Illawarra dairy farmers. Crops such as Japanese millet, maize, sorghum, lucerne, red clover and winter cereals all find a place on the dairy lands of this portion of the south coast in supplementing pasture growth, and, in addition, thousands of tons of these crops are conserved in the form of silage. Yet there is still room for further activities in these directions, and in this connection field officers of the Department of Agriculture are always on the alert to find a new crop or an improved variety which is likely to give, if possible, more satisfaction than the green fodder crops already grown by farmers.

Trials at Wollongong.

Some twenty years ago trials were carried out in the Illawarra district with a species of fodder cane known as "Indian cane," but it did not prove a success. Interest in fodder canes has been revived in recent years by the satisfactory results achieved at Wollongbar Experiment Farm, near Lismore. With the idea of trying out several varieties of the more suitable fodder sugarcanes in the Illawarra district the Department is co-operating with Mr. E. Chinnick in carrying out trials on his dairy farm at Wollongong.



Two-year-old Fodder Cane (Broadwater No. 1) Growing at Wollongong.

The varieties under test are Broadwater No. 1, Chin Chin, Malabar, and Q. 813, and these were planted over two years ago. The original "sets" were knocked about a good deal whilst in transit from Lismore to Wollongong, and this was reflected in the patchy appearance of the plots during the first twelve months.

The "sets" were planted on 19th September, 1934, 1 foot apart, with 4 feet between the rows. Superphosphate was applied at the rate of 2 cwt. per acre. The plots are situated on a hillside fully exposed to the west. The soil, which is of shale derivation, would not be considered rich. The higher portion of the area is sufficiently frost-free to be capable of growing green peas during the winter without frosts damaging the pods.

Broadwater No. 1 the Best.

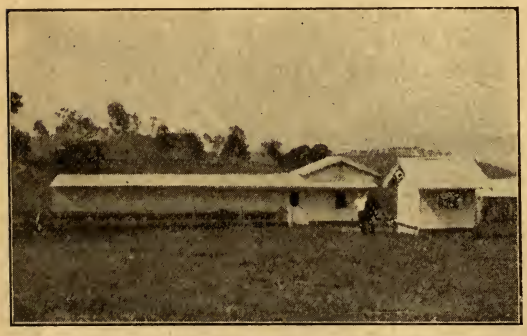
The plots came through their first winter well and in the spring of 1935 Mr. Chinnick extended the plots down the hill, at the same time filling in the misses in the old rows, and then thoroughly cultivating the plots. Excellent growth was made during the spring and summer of 1935 and the dry hard winter of 1936 was weathered satisfactorily. The photograph reproduced on the previous page was taken on 19th September, 1936, and gives a good idea of the growth made by Broadwater No. 1 during the previous twelve months. This variety carries heavy growth and in portions of the plot attained a height of over 6 feet. It is the best of the varieties under test both from the point of view of yield and succulence.

Chin Chin has also done fairly well. It is of even growth, and a cut taken on 27th October last from the plot planted on 19th September, 1934, yielded at the rate of 34 tons 5 cwt. per acre.

These experiments are being extended to other south coast districts where it is hoped cane-growing for green fodder will prove successful.—R. N. MAKIN, Senior Agricultural Instructor.

Modern Dairy Premises.

WHEN Mr. S. Scott decided to transform his property at Numbugga (Bega district) from a dry cattle run into an up-to-date dairy farm, it became necessary to erect dairy premises and yards. For this purpose it was decided to use the design issued by the Department, and a gently sloping site with a northerly aspect was selected on which to construct the buildings.



Rear View of the Newly-erected Buildings.

Showing bails, attached separator room and detached milk and cream storage room.

Machine-type bails were decided upon (six double sets) with attached separator room and with a detached milk or cream storage room, all with well laid concrete floors.

The walls have been erected on concrete bases, which will ensure long life and prevent any decay by saturation with water used for washing the premises. The walls and underline of the roofs of the separator room and cream storage room have been lined with fibro-cement sheets.

Ventilation of the separator room has been provided by raised ridge capping and



Front View of the Bails, etc.

Showing main yard, part of concreted bail yard, wash-up verandah and attached separator room.

by openings in the walls about 12 inches above the floor level. The ventilation of the cream storage room is similar to that of the separator room. This room has been erected on the hill slope above the bails and at a safe distance from them, so that no odours or dust may reach the milk or cream stored in the room.

The necessary enclosed wash-up verandah with concreted floor and drains, wash-up vat, water heater, etc., all well constructed, are provided.

The bail yard surface has been concreted and this reduces dust to a minimum during milking time. It is also easy to wash down when the bail floors are being washed.

The main yards, in which split timber has been used for fencing, have been well laid out, so that the cows can be worked through them with a minimum of effort and inconvenience.

The cost of construction of these premises which includes the cost of labour, was supplied by Mr. Scott, and is as follows:—

	£	s.	d.
Timber ..	40	15	6
Cement ..	52	0	0
Iron ..	17	0	0
Fibro-cement, cover strips, etc. ..	11	15	0
Labour ..	35	0	0
	£156	10	6

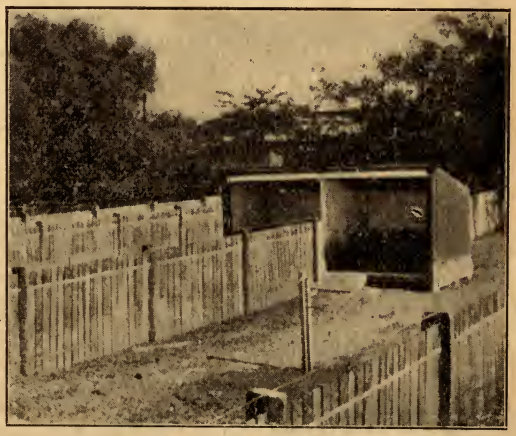
—S. R. BALLARD, Senior Dairy Instructor.

The Proper Housing of Pigs is Important.

THE pig has proved its worth on many a dairy farm, but it would often be found very much more profitable if extra attention were given to better housing conditions.

It is a common custom to put the piggery anywhere out of sight without any reference to hygienic considerations. The sty is usually built out of second-hand or bush timber. Often pigs are enclosed in small yards in low-lying situations, with the result that the pigs have little exercise, and the enclosure is soon a quagmire in which the animals sink to their bellies. In damp, cold, changeable weather they have little shelter and suffer in consequence, while the filthy state of their surroundings and the fact that the pens and yards are rarely if ever cleaned out tend to make infestation by parasitic worms highly probable. Other diseases which may reasonably be expected to result, and which commonly do occur, are pneumonia, ulcerative granuloma, and necrotic enteritis. Even if the owner is so fortunate as to escape actual disease in his stock, these unhygienic conditions lengthen the period of fattening and tend to hinder the animal's development.

Shelter is essential for pigs. Swine have been so long domesticated, raised under artificial conditions, and bred to turn all their energy to rapid growth and fattening, that they are very susceptible to dampness, cold, draughts, and hot summer weather. There are two main types of piggery commonly in use—(*a*) central houses, containing a number of pens, and (*b*) individual houses, holding but one or more pigs. The former are more convenient and save labour, while



Good Yards and Houses Mean Extra Profits.

the latter are less expensive to erect, are quieter, and can be removed to new ground if necessary; but of whatever type the house may be, attention must be paid to the following points:—

1. Sties should, if possible, face the north or east, so that they will get the full benefit of the sunlight. Sunlight is a most efficient

germicide, and is a great help in keeping the sties sweet and sanitary.

2. Sties should be built on rising ground to ensure good drainage. This does not necessarily imply that they should be placed on the top of a hill, where the animals would be exposed to every wind that blows.

3. The roof should be sufficiently high to admit of the sty being cleaned easily. The idea of keeping a pigsty clean is revolutionary to some farmers, but disease and filth are associated as a rule, and cleanliness is essential to the preservation of health.

4. The walls should be smooth, so that there is no harbour for animal parasites. On this account walls of split bush timber are objectionable.

5. Allowance must be made for plenty of sunlight and fresh air.

6. The walls must be impervious to the wind, so that the sty is not draughty.

7. The floor should be impervious to moisture. The common custom of allowing the pigs to sleep on the earth, while doing away with the necessity for bedding, has much to condemn it. The earth is easily rooted up, is damp and cold in winter, and is soon saturated with filth. Concrete makes the most sanitary floor, but, as it is cold and hard, a sleeping platform of wood is necessary with it. If this is made sufficiently light it is easily removed for the purpose of cleaning the sty. A floor made of hardwood, well joined and raised above the ground level, is quite satisfactory; but floors made of slabs laid on the ground are little better than the earth itself.

Interested readers are invited to write to the Department for copies of the free leaflets on different aspects of pig-raising.

Maize Feeding and Bacon Quality.

EXPERIMENTS conducted by the County of Londonderry Committee of Agriculture showed that when excessive quantities of maize were fed in the rations of fattening pigs it was almost certain to injure the quality of the bacon, reports the *Pig Breeders' Gazette* (London). Rations containing 20, 40 and 60 per cent. maize meal were fed to different groups of pigs, and it was shown that the group getting 60 per cent., and to a lesser degree the group getting 40 per cent., produced bacon that was poor in quality.

Other trials in the counties of Tyrone and Fermanagh confirmed these results.

The foregoing confirms local experience. It is agreed that pigs fatten well on maize. In fact, maize is one of the richest of the cereals in carbohydrates and fat. It, however, produces a soft bacon of inferior quality, and for that reason the Department has advised that maize should never constitute more than 50 per cent. of the grain ration, a more desirable figure being 35 per cent.

Insect Pests and Their Control.

(*Continued from page* 44.)

The Coon Bug—(*Oxycarenus luctuosus*).

During the present season these small native bugs have been unusually abundant in coastal and inland areas of New South Wales.

The adult bug is approximately ⅛ inch in length, and is marked with black and white, the immature form being blood-red marked with black. These bugs have, at times, been recorded swarming in great numbers on fence posts in inland areas. They normally feed and develop in weeds, and as a rule do not attack cultivated crops. However, this year some small amount of damage has been caused by this insect, it having been found feeding on figs, cherries, nectarines, raspberries, etc.



Fig. 15—Coon Bug (*Oxycarenus luctuosus*).

It is considered that the unusually dry conditions, with a consequent lack of herbage, have been largely responsible for the bugs infesting cultivated plants.

The best means of controlling the pest is to dust infested plants with a mixture of equal parts of pyrethrum powder and 2½ per cent. nicotine dust. The two dusts should not be mixed together until just before use.

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DEPARTMENT OF AGRICULTURE.

NEW SOUTH WALES.

LIST OF PUBLICATIONS OF THE DEPARTMENT

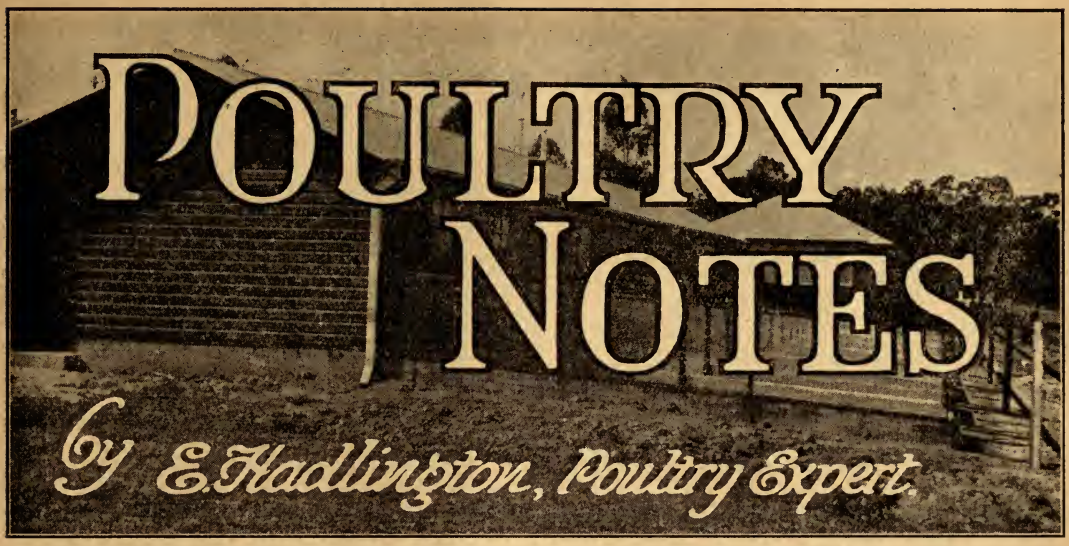
PART I—

Sale Books and Bulletins.

PART II—

Free Publications.

Copies of this list are obtainable, free of charge, from the Under Secretary, Department of Agriculture, Box 36a, G.P.O., Sydney.



Stocktaking.

ALL poultry-farmers should make a practice of counting their stock at the beginning of the year in order to enable a summing-up of the operation of the farm.

Without at least an annual stocktaking, it is not possible to know just the financial position of the farm, because the rearing of a greater or smaller number of young stock than the previous year will naturally affect the income.

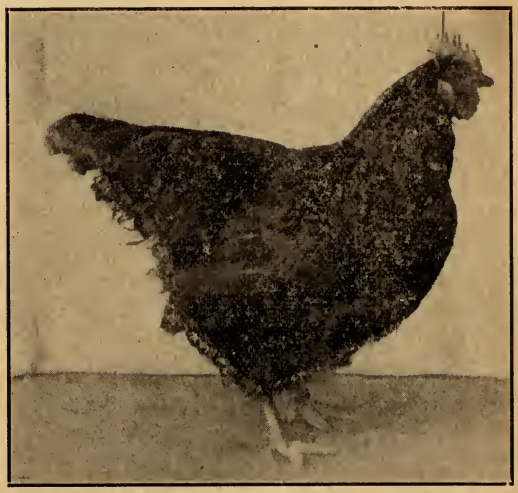
It is also necessary to know the number of layers to assess whether egg production is up to normal expectations. For this reason it is desirable to take stock at the middle of the year as well so that a check can be made on egg production throughout the flush season.

Not a Difficult Task.

Many poultry-farmers are apt to look upon stocktaking as a somewhat difficult task, but where pens are so constructed that the birds can be shut in at night, it is quite an easy matter to count the birds as they are let out of the houses in the morning. If it is not possible to shut the birds up at night, it is not difficult for two persons to count them in the runs, provided there is not much undergrowth in the yards. In any case, on any well-conducted poultry farm, the counting of the stock should be one of the regular jobs at this time of the year.

Keep Each Year's Rearing Separated.

It is not only necessary to check the numbers of stock, but it is desirable that a record be kept of the numbers of various ages, and in order to do this, each year's birds should be marked with distinguishing rings, and as far as possible the birds of different years' rearing should be kept in



First Hen to Reach 200-eggs Mark in the Current Hawkesbury Agricultural College Egg-laying Competition.

Messrs. C. Judson and Sons' Australorp hen which laid 200 eggs in 230 days, thus winning the *Poultry Newspaper* Special Prize of £3 3s.

separate pens; otherwise counting presents much more difficulty.

A Guide to Maintenance Numbers.

Many cases have been encountered where poultry-farmers have complained that little profit has been made on the year's operations, and upon going into matters it has been found that a much greater number of young stock was being reared than was necessary for the maintenance of the adult stock, yet this factor had not been taken into consideration until a count of the birds revealed the true position. Thus, while on a stocktaking basis the asset in stock had been considerably increased, the revenue from the hens had been largely absorbed in rearing the pullets to productive age.

This point is often lost sight of by those working up a flock; where the numbers are being added to appreciably, no cash profit is shown until a regular number has been arrived at and only sufficient pullets reared to maintain the flock.

Feather Picking and Cannibalism.

From time to time each year, cases come under notice where feather picking, and sometimes cannibalism, exist, either separately or in combination, and while in some instances the trouble occurs where conditions leave little to be desired, usually there are factors present which might either separately or conjointly account for the outbreak.

This year these troubles appear to be more prevalent than usual, and, no doubt, the dry weather conditions have contributed in some degree to outbreaks in certain cases, due to lack of green feed and the ground becoming more hardened than normally, thus preventing the birds from scratching in the soil. Some cases have been investigated where there is an abundance of green feed, but there have been other causes to account for the condition.

The accompanying photographs show pens of birds on two different farms where many of the hens were practically denuded of feathers, particularly around the abdomen, neck and back, and these are characteristic of a number of cases observed.

The Habit may be Acquired Early.

In endeavouring to arrive at the reason for feather eating it is often necessary to go back to the early stages of rearing, as it is frequently noticed that the vice commences even as early as the brooding period, and follows through to the adult stage, becoming more pronounced as the birds reach the end of the flush-laying period. In other



Flock of White Leghorns showing Results of Feather Picking in Advanced Stage.

instances the trouble may start only after the pullets come on to lay. Often feather picking is not observed until bare patches appear about the abdomen and neck.

why the trouble is more pronounced among birds fed on dry mash, as it is not safe to use the same quantity of salt in a dry mash as where the mash is fed wet.



Flock of Langshans and White Leghorns Similarly Affected.

Contributing Causes.

Some of the most common causes of feather picking are insufficient salt in the ration; too close confinement; overcrowding; small bare yards; perches too close or too low; feeding a highly concentrated ration, or one lacking protein supplements; shortage of green feed, and lack of suitable shell grit, or possibly in some cases, absence of gravel in the soil.

In connection with the first item, salt, it is a matter of definite experience that if the ration for chickens is deficient in this respect, outbreaks of cannibalism (toe and tail picking) may be expected; and where this trouble exists, the addition of extra salt, up to 1½ per cent. in each feed, will usually effect a cure.

More Pronounced where Dry Mash is Fed.

Similarly, if there is a shortage of salt in the food of the older birds feather eating may be induced. This is one of the reasons

Another direction in which the feeding of dry mash tends to cause feather picking is the fact that the birds have of necessity to congregate around the hoppers for the greater part of the time to obtain their requirements, and when constantly clustered together they are likely to acquire the habit of picking at each other's feathers.

The same tendency is noted where birds are closely confined or overcrowded, especially if they are not kept busy by providing plenty of scratching litter and feeding them in it.

A convincing illustration of this was observed on a mammoth poultry farm in Scotland, where 500 to 1,000 young pullets were housed together on woven wire floors. Tail picking was so rife that not a bird was left with a tail.

Perches Too Close and Too Low.

The trouble is often experienced where the perches are close enough to permit of

the birds picking those opposite while sitting on the roosts; or if too low, the same thing occurs from the floor. Feather picking is also more common where the runs are at the back, instead of the front, of the houses, as the birds remain inside during windy weather, and so the mischief spreads.

It sometimes occurs that a few birds are responsible for an outbreak of feather picking, due to the fact that while remaining inactive in the houses they set an example which the others follow.

The feeding of over-stimulating rations, such as those containing too much meat meal, or other protein supplements, and also condiments, is often the cause of this trouble, but, on the other hand, if no concentrates are used the effect may be the same.

Remove the Probable Cause.

In summing the matter up, it will be found that in most instances where feather eating is prevalent there exist at least some of the conditions outlined, and the only course is to remove any of the probable causes, but it must be realised that when the trouble has progressed to such an extent that many of the birds are showing bare patches on the body, it cannot be expected that there will be any immediate improvement. Moreover, the appearance of the birds will not be altered until they get a new coat of feathers.

Cannibalism Caused by Similar Conditions.

The conditions responsible for outbreaks of feather picking are likely to also cause cannibalism, or the latter trouble may result through the birds' bodies becoming partly bare by feather picking.

Another condition conducive to this vice is the nests being too exposed to the light, especially if they are not deep enough, or if an alighting-board is placed in such a position that the birds, by standing on the board, can pick those in the nests.

Confused with Protrusion of Oviduct.

Many cases of so-called protrusion of the oviduct are nothing more than advanced stages of cannibalism, and without close observation it is difficult to distinguish between the two, because as soon as protrusion occurs the other birds attack the victim, and in a short time the visceral organs are picked out. Therefore, unless a bird is seen with the oviduct actually everted before being attacked by the others, it is by no means certain whether it is a case of prolapse of the oviduct.

It is significant that where the birds have good large runs, are not crowded in the houses, and are fed a simple, balanced ration, together with a reasonable supply of green feed, cannibalism and feather picking are seldom experienced. Thus, these troubles can be largely attributed to management and environment.

REMINDERS FOR JANUARY.

Avoid crowding the young stock, either by placing more in the houses than they will properly accommodate, or by filling to capacity the large houses. Any crowding during the warm, humid nights, which may be expected from now on to the end of the summer, is likely to result in respiratory troubles and also cause an early moult.

* * * * * *

A start should be made to prepare any new land for planting lucerne or Berseem clover, so as to have it thoroughly worked for sowing in March. Remember that a good green feed crop is a valuable asset on a poultry farm.

* * * * * *

Don't neglect to clean up all chicken-rearing equipment as the pens are emptied.

* * * * * *

Cull out any of the ne'er-do-wells among the late-hatched pullets. It is only a losing proposition to keep any birds which are not robust and well developed, as they will not make much progress until the autumn. These are the birds that are very late coming on to lay, and then do not lay consistently.

Gout in Poultry.

Associated with Incorrect Feeding and Management.

T. G. HUNGERFORD, B.V.Sc., H.D.A.

THIS disease is by no means common, but does occur from time to time. It may be confused with other important disease conditions which are infectious, and it is, therefore, necessary to be able to differentiate between this condition and others of more importance.

Gout is due to the deposition of urates in various portions of the body. These urates are derived from uric acid, which comes from the breakdown of nucleo-proteins. These nucleo-proteins may come from the food which is eaten, or from the tissues of the bird's own body. Why these normal food constituents should meet this abnormal fate is a little difficult to understand. It may be due to some defect in the normal function of the kidney, to excessive destruction of the tissues of the bird for some particular reason (other concurrent disease), or to the overfeeding of animal protein material which is rich in nucleo-proteins. Thus the cause is not completely understood, but it has been observed that several conditions predispose birds to this disease.

Predisposing Conditions.

In one instance recorded overseas, hens were fed exclusively on a diet of minced horse meat which had been freed from fat, and in from three to fifteen months every bird became affected with gout in some form.

It has been found that if birds are kept in damp, cold conditions and given little exercise, the disease is likely to occur.

Experimental ligation of the ureters (the tubes which connect the kidneys with the cloaca) will sometimes produce gout, demonstrating the relation between this disease and abnormality of kidney function.

Often the only time gout is observed is when fowls are slaughtered for table purposes, or post-mortemed in the course of other disease investigations, and unless it is recognised as a clearly separate disease confusion may result.

Where birds are run under conditions closely approximating their natural state, the disease does not occur, and it must, therefore, be regarded as primarily associated with bad conditions of feeding and management.

There are different forms of the disease depending upon which part of the body becomes infiltrated with the urates.

Joint Gout.

There may be a deposit of urates in the cartilages of the toe and leg joints and in the surrounding tissues of the bird, and this results in inflammation with swelling and tenderness. This is evidenced by the bird standing first on one leg and then on the other, and by walking with an irregular or hoppy gait. The pain and inconvenience, and presumably loss of sleep, may result in emaciation.

Visceral Gout.

The pleura, peritoneum and pericardium may become covered with deposits of urates. The surface of the liver, intestines, spleen, lungs, kidneys and the heart may similarly be covered, so that the abdominal cavity (on post-mortem examination) has the appearance of being dusted with chalk; or, at other times, the urates have a more cheesy appearance. The pericardium may be covered with this material on the outside and the inside. In the latter case it becomes attached to the heart muscle. The kidneys show fairly marked changes, in most cases being paler in colour than normal, and having white spots throughout their substance. These white spots are also deposits of urates. This condition of the kidneys cannot be differentiated from the similar condition due to acute green feed deficiency disease. In both these diseases the ureters will also be abnormal and are noted as hard round tubes filled with urates.

All of these symptoms may not be seen in any one case of visceral gout, but will vary with the severity of the disease. In very severe cases deposits of urates may be seen in the liver and spleen. Mild inflammation of the intestines may also be present.

Symptoms.

The cases of joint gout will be easily noted as described above, but cases of visceral gout may show no symptoms whatsoever, the first indication of the disease being found after killing the bird. At times visceral cases may show all the typical symptoms of general metabolic upset, that is to say, darkness of the comb, thirst, ruffled plumage, inappetence and depression. Such cases as this may die within a week of showing symptoms.

Preventive Measures.

The methods of feeding and management should be critically examined and all errors rectified. It is important not to feed excess of animal proteins, and if meat meal is the source of protein supplement, not more than 6 per cent. should be fed. Ample green feed of a good succulent quality should be provided, and the birds should be encouraged to take exercise by being placed on open range, or, in intensive and semi-intensive systems, by placing their grain in litter so that they have to scratch for it.

Differential Diagnosis.

Bumble Foot.—This is a condition in which some of the cells of the deep structures of the pad of the foot die owing to infection by a germ, usually secondary to some injury (bruise or puncture). It results in a purulent inflammation and swelling of the surrounding parts. The inflammation may spread up the tendon sheaths and involve quite a widespread area. This condition is well known and should not be confused with joint gout.

Bumble foot usually yields to surgical treatment.

Tuberculosis.—This disease has been dealt with previously in this journal, and, as there described, cheesy tubercles may be seen in the abdominal organs and mesentery. Cases of visceral gout may be easily confused with abdominal tuberculosis, and when in any doubt whatsoever an affected bird should be forwarded to the Veterinary Research Station, Glenfield.

Tuberculosis of the joints may also be confused with joint gout.

Green Feed Deficiency Disease.—This is described in full in a separate departmental publication. The typical symptom is yellow pimples down the back of the throat and gullet. One symptom of advanced cases of this disease is, however, white spots through the substance of the kidney and filling of the ureters with urates. This symptom is also seen in visceral gout.

Septicaemic Pullorum Disease in the Adult.—In this condition white necrotic areas may be seen on the pericardium, and cheesy necrotic material may occur on the mesentery, giving the appearance of visceral gout. However, in septicaemic pullorum disease, the other characteristic symptoms (enlarged discoloured liver, etc.—see separate publication, which can be had on application to the Department), will clearly differentiate the two conditions.

Contour Planting of Fruit Trees.

(*Continued from page* 34.)

Contour Banks.

Contour banks running through the orchard will be found an advantage, especially if the slope is a very steep one. In many cases, however, if the orchard has been carefully contour planted there will be no necessity for the additional banks. Should it be found that there are one or two low places in an orchard planted on contours, or that the cut-outs and banks made by the ploughs are not of sufficient size and are unable to carry off the surplus water, contour banks can be easily and quickly made at any subsequent period when and where desired.

In practice it is found that extra wide lands are not essential to satisfactory contour banks. Where the rows of trees are, say, 22 feet apart, there is ample space to throw up a satisfactory bank. Should it be found necessary to build contour banks the disc plough is the most suitable implement for the work.

THE AGRICULTURAL BUREAU'S PAGE.

Form a Local Branch

And Utilise the Service the Organisation Provides.

THE object in view in joining an organisation is to get the service that organisation provides. As the Agricultural Bureau is a decentralised organisation, with self-contained and self-controlled branches, there is not much to be gained by joining a branch unless the member is within attending distance of the branch. For this reason the tendency has been to form small branches in convenient farming and grazing localities rather than in the towns. The minimum of persons necessary to form a branch is twenty. These may be men, women and children.

All Producers May Benefit.

The Agricultural Bureau suggests a scope of activities which, properly carried out, must be beneficial to every locality and to every man on the land, irrespective of the size or of the nature of his operations.

HAVE YOU

a Branch of the Bureau in

Your Locality ?

IF NOT,

Why Not Form One ?

The procedure is simple, and the cost of running a Branch is small, while an active Branch in your locality would open up a wide field for useful and constructive activity.

Full particulars as to the Constitution, the procedure of forming a Branch, and suggestions as to the working of a Branch are contained in a leaflet which will be forwarded to you on application to the Under Secretary, Department of Agriculture, Sydney.

There are always community matters on which united action is desirable, and the Agricultural Bureau can, and does, function successfully in many centres as a progress



A Practical Demonstration in the Field.

association, but the Agricultural Bureau emphasises that the soundest help to progress is obtained by being in a position always to get the facts that affect the position. There is always much about which we require to have more detailed knowledge, more actual data, more general information. The Bureau is organised to provide that information. There is information available on practically every matter conected with production that would be of the greatest value to every producer if properly understood and properly applied. A slogan of the Agricultural Bureau is "Right Information at the Right Time is the Safest Guide to Success."

The Department Assists in Many Ways.

The various branches of the Department of Agriculture offer a source of practical advice and instruction to every man on the land, the extent to which the various branches can serve the individual depending largely on the nature of the producing industry he has adopted. To the fruit farmer, for example, the fruit branch, biologist's branch, entomologist's branch, and the publications branch of the Department might be expected to provide the most definite service of advice. To the extent that the fruitgrower is interested in vegetable production, the services of the special agricultural instructors dealing with vegetable growing would be of value.

To the mixed farmer, the services of the field branch, the agrostologist's branch, the sheep and wool branch and the veterinary branch might be expected to play a most prominent part in the programme, while, of course, the scientific branches, publications branch, piggery, poultry, beekeeping branches, etc., would all be included. To the grazier the veterinary branch, agrostologist's branch, field branch, sheep and wool branch, might be stressed in the first place, while, of course, the work of the scientific branches and the publications branch would be of importance.

Branch Activities—A Wide Scope.

In describing the activities of a branch of the Bureau no definite programme can be set out, for branches operate in all parts of the State and are interested in all agricultural industries, and the programme of each branch depends very largely on the initiative of the officers of the branch; but programmes are generally made up from the following items:—

Addresses—and there is a vast variety of subjects and speakers that can be drawn upon for this purpose.

Demonstrations.—These range from post-mortem examinations of stock to machinery demonstrations, pruning demonstrations, cookery demonstrations, and demonstrations of fancy work, first-aid, etc.

Experiments and Field Days.—The range of these is limited only by the initiative of a branch and the aspects of farming practice that are controversial.

Social Activities.—Picnics, sports, dances, etc.

Debating, etc.

Co-operation with other Organisations, such as the Show Societies, Junior Farmers' Clubs, etc.

Crop, Stock and other Competitions.

Pool Buying, Pool Consigning, etc.

These are merely given as indications of possible activities on the part of a branch—the only definite limits to branch work set out in the constitution being that all activities shall be definitely non-party political and non-sectarian.

Farrer Research Scholarship to Mr. Olaf Perkman.

THE trustees of the Farrer Memorial Fund have awarded a Farrer Research Scholarship to Mr. Olaf Perkman, who has just graduated as B.Sc.Agr. at Sydney University. The scholarship has been granted for one year, with the right to the trustees to extend it for a further year.

Mr. Perkman is to undertake research, as a liaison officer between the Plant Breeding and the Chemistry branches of the Department of Agriculture, in problems affecting improvement of quality and yield of wheats.

He will proceed to New England Experiment Farm (Glen Innes) for about ten weeks, assisting in the harvesting of the wheat breeding plots, then will enter the Chemist's Branch to work on cereal chemistry problems, at the same time maintaining contact with the field work of the Plant Breeding Branch.

Mr. Perkman matriculated from Sydney High School.



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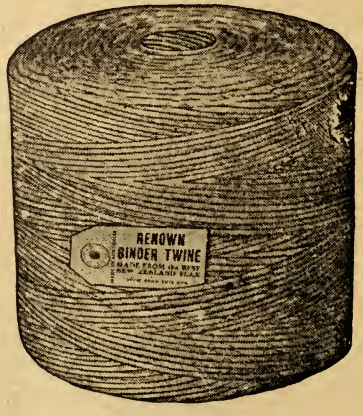
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2ft.	3, 4, 5, 6, 7, 8, 9 and 10ft.		
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Have a talk with the Clyde Agent in your district or write to us for details of whatever Farm Machinery you require.

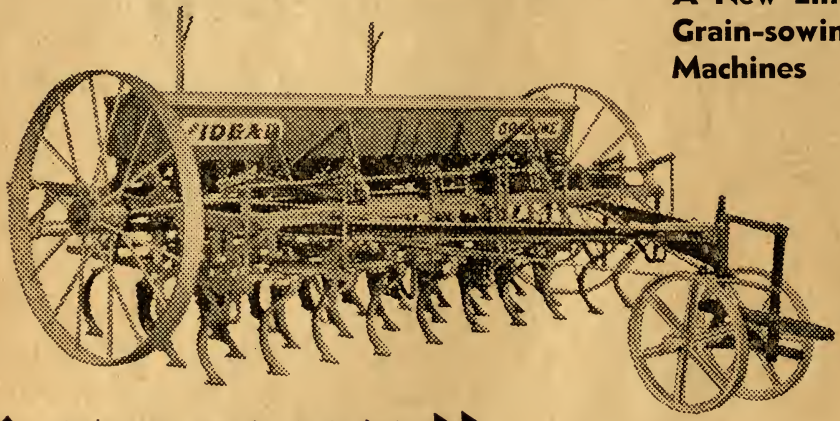
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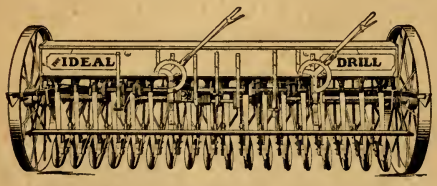


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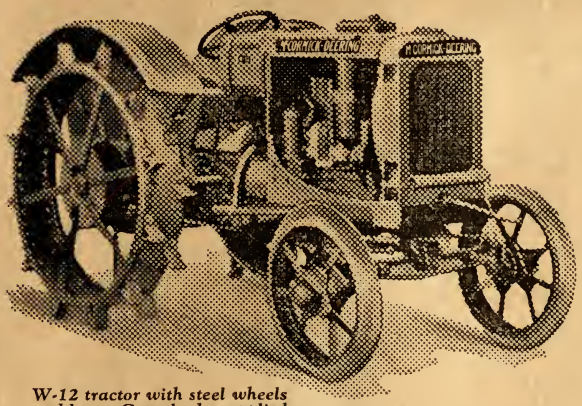
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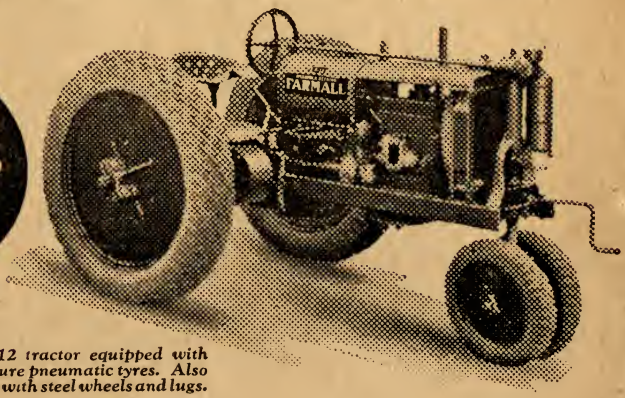
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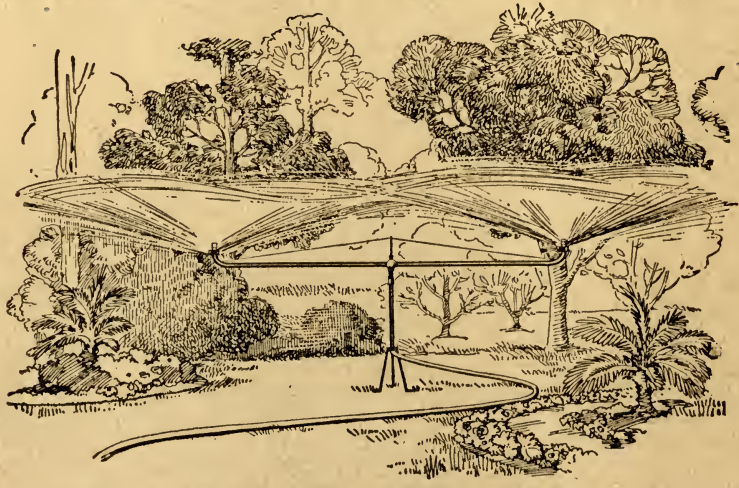
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